Vol. 192 82nd Year No. 3527

THE GAS JOURNAL

DECEMBER 24, 1930

To All Our Readers—

A Happy Christmastide.

A Glance at the Contents—

Nottingham Gas Conspiracy Case.

All the defendants in the Nottingham Gas Conspiracy Case were committed for trial by the Nottingham Magistrates on all charges.

Thermal Expansion of Refractories.

An important paper by R. V. Widemann, A. Jourdain, and H. Cassan on this subject appeared in a recent "Journal des Usines à Gaz," and a résumé is published in our Continental Notes this week.

Demonstration of New Gas Furnaces.

As was stated in the "JOURNAL" for Nov. 26 last, Messrs. Sir W. G. Armstrong Whitworth & Co. (Engineers), Ltd., of Newcastle-on-Tyne, recognizing the fact that in modern industry heat is a more important factor than power, and that gas has proved itself the most convenient form of potential heat, are producing at their Scotswood Works an extensive range of gas-heated industrial furnaces and appliances. Some photographs to-day show good examples of these, at present being demonstrated in the Newcastle-upon-Tyne and Gateshead Gas Company's Grainger Street Showrooms.

External Producer Plant at Wandsworth.

Published to-day is the second of the two short papers read before the London and Southern District Junior Gas Association at their December meeting on 12th inst. Mr. E. T. P. Chambers, B.Sc. (Eng.), in an interesting manner, describes the external producer plant of the chamber oven installation at the Wandsworth Gas-Works, at the same time giving a brief description of the whole plant. Among the advantages claimed for the plant, Mr. Chambers mentions that of clean producer gas, constant quality and high calorific value, together with saving of labour and easy and accurate control.

The "Dri-Gas" Plant at St. Andrews.

Thirty members of the Scottish Junior Gas Association (Eastern District) visited the Gas-Works of the St. Andrews Gas Company on Saturday, Dec. 6. Mr. George Bruce, Engineer and Manager, conducted the visitors over the Works. Particular attention was given to the "Dri-Gas" plant which has recently been installed, and Mr. A. Morris explained the various points. Later, Mr. Morris read a paper describing the plant in detail. The conditions in the distribution system, he states, have rapidly improved since the installation of the plant. After a few days' operation the holder drips ceased to give the usual 4 gallons of water daily, and have since become dry.

Mr. W. M. Mason at Chesterfield.

Mr. W. M. Mason, Manager of the British Commercial Gas Association, addressed a meeting of members of the Chesterfield Chamber of Trade at Chesterfield Corporation Gas Department's showrooms recently, and dealt with the gas industry and its connection with public service.

Annual Banquet of Sales Managers' Association.

The annual banquet of the Incorporated Sales Managers' Association, who were on the occasion honoured by the presence of H.R.H. the Prince of Wales, K.G., was held on Dec. 16. The President of the Association, Sir Francis Goodenough, C.B.E., was in the chair, and the banquet took place in the Guildhall.

Practical Application of the Principles of Rate Making.

The report of the Sub-Committee of the American Gas Association, who have been dealing with this question, under the Chairmanship of Mr. G. I. Vincent, is published on later pages. The solution of the problem may be different in every gas utility, but the general principles apply to all. It is, however, impossible to lay down specific rules to follow, but the Sub-Committee discuss the procedure generally. Regardless of the form of any proposed rate, the tendency should be to give the benefit of lower costs to those customers to whom the utility company's cost of service is in fact lower. There is also usually involved in making general rate improvements the problems of increasing charges to customers who are receiving service at less than the actual cost.

Automatic Seal Arrangement for C.W.G. Plant.

At a meeting of the Midland Junior Gas Association in Birmingham on Dec. 11, Mr. J. H. Wainwright, M.Inst.Gas E., of Halesowen, describes an automatic seal arrangement for carburetted water gas plants. The device is intended for use in connection with gas where a "flow" or "no flow" state is desired; in other words, where the full volume of gas, or none at all, is allowed to pass. In principle it is somewhat similar to the ordinary seal box, though, whereas the ordinary seal box has only two compartments and gas can only flow in one direction, the automatic seal box has three compartments, and gas can be allowed to pass in two directions, or stopped completely, and is controlled by one lever operating three-way cocks and suitably arranged small connections between the various compartments.

EDITORIAL NOTES

Outside Producers.

IN October last we published the results of the working of the Trefois producers at Manchester, which formed the subject of a paper by Mr. A. L. Holton and Mr. H. C. Applebee before the Manchester District Institution of Gas Engineers and Managers. These producers have been successfully operated on practically all grades of coke breeze—a breeze containing up to 40 p.ct. passing through ¼-in. mesh having been utilized with complete satisfaction. The authors stated that "the Trefois producer has proved completely satisfactory for the manufacture of producer gas from materials which would otherwise have been useless." We suggested at the time that the account lost much by the omission of the capital costs of the plant with which the authors dealt; and the same criticism may be put forward in connection with the short paper on the external producer plant of the chamber oven installation at the Wandsworth Gas-Works, which Mr. E. P. T. Chambers read at the last meeting of the London and Southern District Junior Gas Association.

There are at present two external producers at Wandsworth feeding a "C.O.L." intermittent vertical chamber plant having an output of 2,600,000 c.ft. of gas a day; and in contrast to the Manchester system, the producers are fed from an overhead hopper with screened coke up to 1½ in. diameter, one-third of a ton of coke being charged at half-hourly intervals. The size of coke is interesting, because ¾ in. to 1¼ in. or 1½ in. coke is the most useful size for the ordinary capacity domestic hot water boiler; it is, in other words, in popular and growing demand. And we are reminded of the recent paper by Dr. E. W. Smith before the Institute of Fuel ("JOURNAL" for Oct. 22, p. 233) in which he made the point that utilization of breeze on the gas-works extends the market for the more remunerative grades of coke (such as the one with which we are now concerned), and cited the case of a gas-works in London employing 43 p.ct. of breeze in the producer fuel. "In this way," he said, "the whole of the available breeze was disposed of, and displaced the larger sizes of coke." In view, therefore, of Mr. Chambers' statement that "if breeze gets into the coke we immediately experience clinker troubles," we suggest that the compensating advantages of utilizing good screened coke in an external producer must be very great in order to justify its operation in this manner. In any case, Mr. Chambers hardly paid sufficient attention to the breeze problem in his paper.

There are several interesting features about the Wandsworth installation. From the producers the hot gas passes into the sensible heat boilers—one to each producer—which extract the sensible heat from the producer gas, which is conveyed to the settings in a cool state, and is then reheated in the recuperators. More steam is thus raised than is required for the running of the whole plant, including the steaming of the charges. After passing through the boilers, the gas enters static washer-coolers, which, besides reducing the temperature of the gas, remove a large percentage of the dust. The two streams of gas then unite, and, before entering the common main, are passed through a centrifugal cleaning fan. The author explains that, on the new installation of chamber ovens, which is now nearing completion at Wandsworth, the surplus steam, if not required in the works mains, will be utilized to preheat the blast, and thus produce a gas of higher calorific value. "In the event of one producer being shut down," explained Mr. Chambers, "the requisite amount of heating gas is maintained by introducing town gas into the producer gas main to supply this deficiency. This method will be unnecessary when the new installation of chamber ovens is completed, as three out of the four producers will then be sufficient to maintain the producer gas supply for both plants. Town gas is also used in this manner when starting-up the settings from cold."

Now for the advantages of the plant, as set out by Mr. Chambers—advantages which obviously weigh heavily in favour of external producers. First, one of the great advantages obtained is that the gas supplied to the settings is clean; after 2½ years' continuous operation at Wandsworth, there is no sign of any deposit of flue dust in the settings, and the silica work has suffered no damage due to the action of ferruginous or alkali matter. Then there is constancy of quality of the gas, which is of high calorific value; labour is saved; repairs and maintenance are exceedingly low; and, finally and highly important, the manufacture of producer gas becomes a thoroughly scientific process. As to working results, the coke consumption is 13·6 lbs. per 100 lbs. of coal carbonized, and the amount of steam raised per pound of coke 1·55 lbs.

A Blow to Freedom?

EFFORTS are, it is now beyond doubt, to be made by the Government to interfere once more with the harassed industries of this sorely tried country. Not only is the help of which these industries are so desperately in need long in coming, but meantime they cannot even be left alone to struggle on their way. The Trade Disputes and Trade Unions (Amendment) Bill, the text of which has now been published, will of necessity undo much of the good accomplished by the Trade Disputes Act of 1927, which, in its turn, was brought about by the General Strike of the previous year. Happily that strike, which was an endeavour to hold the nation to ransom, secured just the amount of success that it deserved; and it was followed by an Act making the way of the strike leader more difficult, and that of the individual trade unionist more free.

The 1927 Act was, indeed, a charter of freedom for the trade unionist, who has, generally speaking, benefited greatly from provisions which are now apparently to be tossed aside, in favour of others that will bring the community once more face to face with the conditions existing in the "bad old times." The present Bill and the 1927 Act have only to be compared to show how different will be conditions under the new measure, though in saying this there is no intention to imply that the wording of the Bill makes everything clear. On the contrary, Parliament is in all probability preparing much work for the Law Courts. However that may be, here is the full amendment regarding sympathetic strikes:

> Any strike or lock-out of which the primary object is an object other than that of furthering purposes connected with the employment or non-employment, or the terms of the employment, or with the conditions of labour, of any person (whether or not employed in the trade or industry in which the strike or lock-out takes place) shall be illegal, and it shall be illegal to commence, or continue, or to apply any sums in furtherance or support of, any such illegal strike or lock-out.

It is also laid down that no offence shall be deemed to have been committed under this section by reason of the illegality of any strike or lock-out, except in respect of acts committed after the strike or lock-out has been declared by the High Court to be illegal. The 1927 Act confines the area of legal strikes to disputes within the trade or industry in which the strikers are engaged, while apparently the new Bill widens the scope of action to permit of other industries joining in. Here, then, we may have the worst of the old conditions all over again.

The alterations desired with regard to the definition of "intimidation" and in connection with the "political levy" may well strike a blow at the liberty of the subject, and that being so it is to be hoped that this latest proposal of the Government will not be carried out.

Smoke Pollution and Buildings.

IMPORTANT evidence was given by Sir Frank Baines, F.R.I.B.A., at the inquiry by the Electricity Commissioners into the application of the Fulham Borough Council for consent to extend their generating station. After stating that the damage due to smoke pollution of the atmosphere had been increasing in the past few years, he produced photographs showing that new Portland stone in Whitehall had decayed an eighth of an inch in fourteen years, and that the lettering on a country war memorial near Stafford had been entirely obliterated in certain parts within about half that period. This damage, he was able to declare, was the definite result of the deposit of sulphuric acid on the stone. He went on to say that he had found evidence of the action of sulphur far removed from industrial centres. As to the monetary extent of the damage to buildings throughout the country as the result of atmospheric impurities, he calculated that, over a quarter of a century, the cost to the nation was from £55,000,000 to £60,000,000. Here, then, is a strong case for a "Purer Atmosphere," apart altogether from vital considerations of health.

Rate Making.

AN excellent review of the practical application of the principles of rate making, by a Sub-Committee of the American Gas Association, is published in the "JOURNAL" to-day, and it will be read with great profit. There is now, of course, general recognition that the flat-rate system of charge is not good economics and is not conducive to development of our industry. The question is how to effect a change advantageously and with a minimum of disturbance, for, as is mentioned by the Sub-Committee, it is usually necessary, in changing from a straight line to the better form of rates, to increase slightly the bills of a number of the customers—not infrequently a majority of the customers. These increases are, of course, made on those customers who are not paying their way. However, it results in an understandable hesitation on the part of the gas undertaking in anticipation of an unfavourable reaction from the community. This hesitation has not always been justified; and opportunities to improve rates for the mutual benefit of the customer and the undertaking have not infrequently been missed because of overemphasis of a danger which, state the Sub-Committee, was really non-existent.

It is pointed out that there are in general four steps in the establishment of a better rate—the determination of competitive costs, the analysis of cost service, the formulation of the practical rate, and the establishment of the rate in the community. Regarding the first, the cost of a substitute service is the economic basis on which development can be planned. To arrive at this basis, accurate analysis is necessary; and the analysis must take into account not merely present conditions, but the effect of the development of particular loads on the severity of competition. As to the formulation of a good rate, the Sub-Committee maintain that experience indicates that the best form of gas rate for residential service is a two-part tariff, including in the first part some portion of the customer and demand costs, the balance of these costs being included in the commodity charges. For domestic heating ("space heating"), the recommendation is a two-part tariff with the first part based on the 24-hour demand, followed by a straight meter rate for the commodity; it is also suggested that all service should be included in the residential heating rate. Coming to "commercial service," the Committee put forward a block rate. This may, if thought desirable, be preceded by a fixed monthly charge to cover a portion of the customer and demand costs, in which case the level of the block rate charges will be lower. The suggestion in regard to the industrial load is to employ a two-part tariff with a demand charge as large as possible, keeping in mind the practical aspects of the competition. Both the demand charge and commodity charge, it is advised, ought to be blocked. If necessary, a protective minimum could be provided, combined as stipulations either in the general classification or in separate classifications.

Dyestuffs Act to Remain.

The House of Lords having decided to insist on their amendment to the Bill continuing the operation of the Dyestuffs Act for another year, the Bill was sent back to the Commons, where the Lords amendment was carried without a division. Lord Hailsham said there was every reason why the Lords should insist on the standpoint they had adopted. All they were asking was that there should be one year during which an impartial inquiry should be undertaken to ascertain whether the danger to the dyestuffs industry was real or not. The Bill also contains other matters of importance to the Government, so that they were unwilling to sacrifice the whole measure on this one point. In addition, they had narrowly escaped defeat when the amendment first came to them from the House of Lords. However, it is only the decision to continue the Act of another twelve months which is of interest to the "JOURNAL."

Carburetting with Fuel Oil.

Through an elaborate series of experiments and comprehensive tests, covering a period of ten years, the Philadelphia Gas-Works and Public Service Electric and Gas Company have succeeded in substituting fuel oil for gas oil in the manufacture of carburetted water gas at all their plants. What has been accomplished by the Company was described by J. V. Richards at the annual convention of the American Gas Association, and the matter was also referred to by Mr. Thomas Hardie, Chief Engineer to the Gas Light and Coke Company, at the autumn meeting of the Institution of Gas Engineers. The substitution of gas oil by fuel oil, explained Mr. Richards, has proved highly successful from an operating viewpoint, and has enabled the Company to circumvent the problem of the gradually increasing price of gas oil, which recently threatened to become almost prohibitive. In the United States to-day, he said, there is such a demand for gasoline that oil producers are utilizing the so-called gas-oil fraction in their various cracking processes, to increase the gasoline supply. Consequently the price of gas oil is increasing, and its price limits cannot be forecast. In other words, the price of gas oil is linked up with the price of motor fuel and gasoline. On the other hand, fuel oil price is determined, at present, largely by the price of coal in producing steam. It is therefore reasonable to believe that the price of fuel oil will be more stable; and for this reason it seems advisable and logical that manufacturers of carburetted water gas should resort to this type of oil for carburetting. It will be remembered by our readers that Mr. Hardie remarked at the Institution meeting that in this country already a generator has been constructed, embodying the necessary modifications to enable the use of heavy oil as a carburant; and he expressed the hope that shortly it will be possible to give particulars of the use of creosote in this way.

PERSONAL

The marriage took place on Dec. 17, at St. George's, Hanover Square, of JOHN KENNETH NEWSOM DAVIS, eldest son of Mr. and Mrs. H. Newsom Davis, of Bamville Wood, Harpenden Common, to Dorothy Eileen, eldest daughter of Major-General Tate, K.H.S., C.I.E., I.M.S., and Mrs. Tate, of 64, Wildwood Road, N.W. 11.

Mr. EDWARD WILSHAW, a past Master of the Guild of Freemen of the City of London, who has been associated for many years with the Eastern and other Telegraph Companies, has been elected President of the Chartered Institute of Secretaries, a body that has the distinction of holding a Royal Charter which extends throughout Great Britain and the overseas Dominions. For long intimately connected with the control of cable ships, Mr. Wilshaw comes from a family which for many generations has had close associations with shipping. He is a Director of the Romford Gas Company, a Liveryman of the Worshipful Company of Shipwrights, and a member of other bodies of the City of London.

CORRESPONDENCE

Gasholder Repairs.

I have read with interest the article "Re-Crowning an Inflated Holder" which appeared in your issue of Dec. 17, concerning the repair to a small gasholder for the University of Birmingham.

The following is an extract from this article, and I cannot let this pass unchallenged:

> The total time taken for the execution of the contract was considerably less than the minimum time required by contractors for stripping the old sheets and fitting new, with entire possession of the holder.

This is rather a startling claim to make.

May I make a comparison by a holder repair carried out by my firm this summer? In our case it was imperative that the work should be started quickly and that the holder be out of commission for the minimum time. Our material was despatched from the works twelve days from the telephoned instructions to put the work in hand. During this twelve days the holder was measured and particulars obtained, material specially ordered and obtained from the rolling mills, and the necessary work put in on it. The holder was out of operation eight days, during which the old sheets were stripped and the new ones fixed. The diameter of the holder was approximately 70 ft., and contained 310 sheets.

The holder shown in the illustration appears to have 52 sheets, so that in proportion this holder could have been crowned in one and a half days' work on the site. For it to be done in "considerably less time," as claimed, means that the repair was carried out in less than one day. Perhaps the contributor of the article will publish the actual time for the work on the site.

The use of welding for the construction or repair of gasholders is not new, but in applying this process to a repair of this character I consider the risks involved are unjustified. If there is any leak of gas in the existing crown there is more than a strong probability that an explosive mixture would accumulate in the space between the new and old crowns, and with the flame from the welding plant all the conditions are ripe for a nice explosion.

In view of the holder failures which have taken place, and also the fatal accidents which there have been from time to time in repairing gasholders, I do not think the gas industry is being well served by contractors advocating methods which, to say the least, considerably increase the risk.

R. W. BROADHEAD.

Broadhead Constructions, Ltd.,
787, Chester Road, Stretford,
Dec. 18, 1930.

Carbonization in Continuous Verticals.

SIR,—The extremely interesting and provocative nature of Mr. Kendrick's paper, "Some Experiments on Vertical Retorts," which you report in the "JOURNAL" for Dec. 15, has prompted me to offer some observations on the question of degradation. At Tipton, I have been trying the effect of high steaming and "top-heats" in degrading hydrocarbons. Since Mr. Kendrick's figures are given for straight coal gas, the following analyses and suggestions therefrom may be of interest:

—	A.	B.
CO_2	3·0	4·0
O_2	0·6	0·5
C_nH_m	1·8	2·1
CO	19·0	17·6
CH_4	16·4	17·1
H_2	53·9	52·9
N_2	5·3	5·8
Calorific value	445	450
Steam, lbs. per hour	100	80
Steam, p.ct. on coal	33	26·5

Now, we can calculate the methane and the unsaturated hydrocarbons as a percentage of the unsteamed coal gas, making use of the following additional data:

> Gas yield per retort per hour from unsteamed coal, 1750 c.ft.
>
> Specific volume of steam, 26·25 c.ft. per lb.

and assuming a 25 p.ct. conversion to water gas (a little higher than the average for actual practice), we obtain:

—	A.	B.
CH_4	28·7	27·4
C_nH_m	3·2	3·4

Thus, in the case of methane, degradation has taken place, probably along the lines suggested by Mr. Kendrick; but it is curious that the breaking-down of the unsaturated hydrocarbons would appear to be in some way inhibited by the steaming.

It may be that the effect is due to differences in temperature at the top of the retort or to the constitution of the coal. In the examples cited above, the coal carbonized was a Yorkshire washed nut, and the temperatures of top combustion chamber flues were from 1220° to 1250° C., giving 1125° C. in the first circulating chamber.

I agree with Mr. Sensicle that "there is insufficient degradation in vertical retorts," but the extent to which it can be increased is limited by other factors, especially the condition of the brickwork. At Tipton, we have found it necessary to strengthen the top brickwork when carrying continuously high temperatures at this part of the setting. Indeed, this is a rudimentary yet practical application of the idea of "zonal construction of the retort" referred to in the discussion on Mr. Green's paper at the recent Institution meeting.

L. B. CHAPMAN, B.Sc. (Eng.).

Tipton Gas-Works,
Dec. 19, 1930.

FORTHCOMING ENGAGEMENTS

Jan. 8.—MIDLAND JUNIOR GAS ASSOCIATION.—Paper by Major W. Gregson, of Messrs. Spencer Boncourt, Ltd., "Steam Generation in Gas-Works Practice."

Jan. 10.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the East Greenwich Works of the South Metropolitan Gas Company.

Jan. 10.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Joint Meeting with Eastern District in Glasgow, Address by Mr. R. B. Glover, A.M.Inst.C.E., A.M.I.Mech.E. (of West's Gas Improvement Company), "Some Notes on the Future of the Gas Industry."

Jan. 10.—WESTERN JUNIOR GAS ASSOCIATION.—Meeting at Bristol. Paper by Mr. H. C. Widlake, of Plymouth.

Jan. 12.—INSTITUTION OF GAS ENGINEERS.—Meetings of Executive Committee (2 p.m.), Finance Sub-Committee (3.30 p.m.), Finance Committee (4 p.m.), and Benevolent Fund Committee of Management (4.30 p.m.), 28, Grosvenor Gardens, S.W. 1

Jan. 13.—INSTITUTION OF GAS ENGINEERS.—Meetings of Council (10 a.m.) and Gas Education Committee (4 p.m.), 28, Grosvenor Gardens, S.W. 1.

Jan. 14.—INSTITUTION OF GAS ENGINEERS.—Meetings of Ammonia and Liquor Effluents Sub-Committee (10.30 a.m.) and General Research Committee (2.15 p.m.), 28, Grosvenor Gardens, S.W. 1.

Jan. 17.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Visit to Bridge Street Distribution Department, Leeds. Paper by Mr. E. R. B. French.

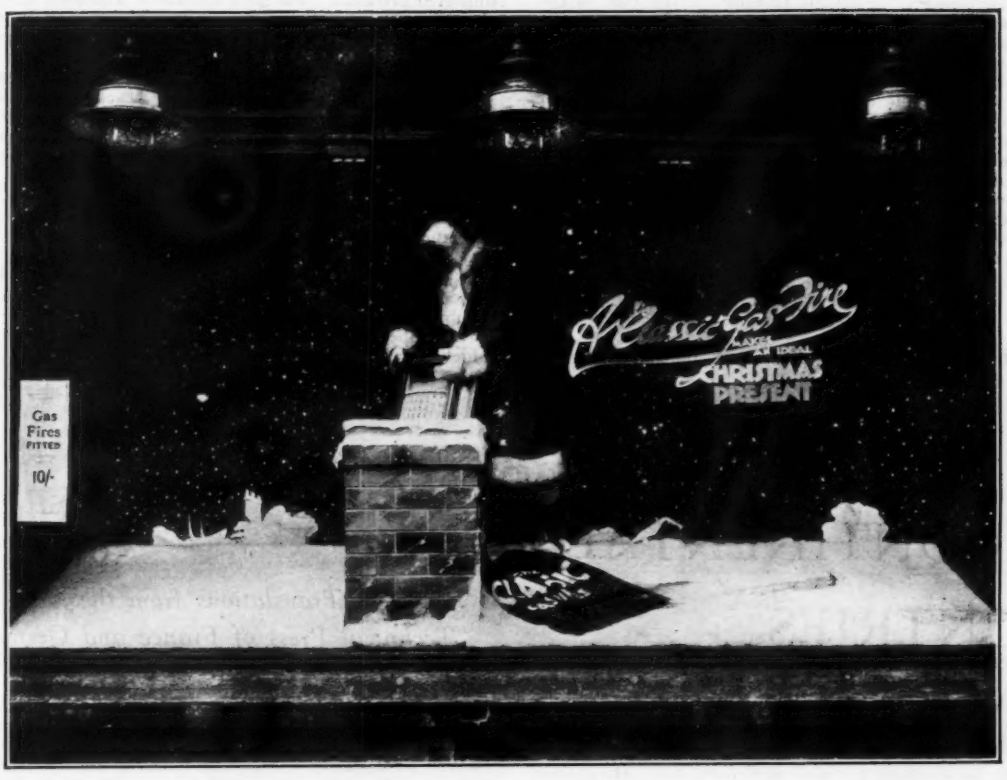
Jan. 20.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the afternoon.

Jan. 23.—INSTITUTION OF GAS ENGINEERS.—Meeting of Board of Examiners (2.30 p.m.), 28, Grosvenor Gardens, S.W. 1

Jan. 30.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Paper by E. W. B. Dunning, B.Sc., "Incomplete Combustion; Its Importance, Recognition, and Prevention."

June 2-4.—INSTITUTION OF GAS ENGINEERS.—London Conference.

Christmas Publicity



This display—featuring Wright's " Classic " gas fires—is attracting a great deal of attention in the Birmingham Gas Department showroom window.

ON THE ELECTRICAL SIDE

Monthly Accounts.

In a report by the Director of the E.D.A., on his recent visit to America, Lieut.-Col. Vignoles referred to an undertaking supplying an area with a population of about 1¼ millions, and having sales of electricity amounting to 1500 million units per annum. As to this undertaking, he said: All accounts are rendered monthly; and notwithstanding the additional cost of reading meters and rendering accounts as compared with quarterly billing, the former system, owing to its many and substantial advantages, is generally preferred.

Rural Electrification.

In his Presidential Address to the Overhead Lines Association, Mr. Bexon confessed to a feeling that we ourselves have had for some time past—that there must be considerable reductions in capital costs of overhead lines if rural electrification is to be made a paying proposition. He urged the Association to go fully into the question with a view to minimizing capital costs, declaring that the Electricity Commissioners would be only too pleased to amend the regulations if the Association could put forward facts and figures.

The Travelling Showroom.

There was recently on view, prior to a tour of the country, a new caravan belonging to Modern Electric Homes, Ltd. It is divided into two rooms. The front compartment is equipped as a sun-parlour with a range of " Sunray Tricity " radiators, and the principal duty of the caravan will be to demonstrate their merits to hotel proprietors. The Company are, we learn, prepared to supply on hire-purchase " Sunray " radiators, with portable slot-meters for hotel bedrooms, and to accept in payment the monetary contents of the meters until the equipment has been paid for. The rear compartment is fitted up as a kitchenette, with a " Tricity " cooker and hot cupboard. Electricity is supplied by a dynamo, driven by the engine.

The County of London Electric Supply Company, Ltd., have also provided themselves with a travelling showroom to serve the inhabitants of the less thickly populated parts of their area of supply. The van opens telescopically, so as to provide an exhibition hall with a superficial area of 484 ft. Its weight is about 6 tons as fitted, and it is hauled from place to place by a specially adapted lorry. The current required in this case is taken from the Company's cables.

The gas industry is already well away with the idea of the travelling showroom.

A Weakness of Water Power.

Papers to hand not long ago from New Zealand contained a statement by the Chairman of the Christchurch City Council Electricity Committee to the effect that without a heavy fall of rain, and in the absence of further stringent economies, the water in Lake Coleridge would be insufficient to meet the power demand in less than a fortnight from that date. No doubt the trouble has before this been surmounted, and the matter is mentioned here merely as indicating a weakness which may attach to too implicit reliance upon water power. The further economies suggested included shutting-off the street lighting on moonlight nights and appeals to shopkeepers to use the minimum of display lighting and none at all after hours, and to the public and to office workers for economies in the use of radiators, water-heaters, and non-essential lighting generally.

Unsatisfactory Electric Tariffs.

" One of the most unsatisfactory matters in connection with the public supply of electricity is the extraordinary diversity of the tariffs employed, and the remarkable ingenuity of many of the designers of such tariffs," said Mr. E. G. Phillips, M.I.E.E., M.I.Mech.E., at a meeting of the Institution of Heating and Ventilating Engineers, when discussing the cost of operating industrial and private electric generating sets, compared with public supply. His contention was that the supply company engineer was usually too scientific to be commer-

cial. It was quite easy to understand the basis of such complicated tariffs; technically they were correct, and could be justified, especially from the supply authorities' aspect. But was it not undesirable and very uncommercial for either the supplier or the customer to be unable to estimate the cost of the commodity on offer? Would it not be considered at least curious if a butcher, when asked his price for mutton, included in his explanation reference to the day of the week, the hour of purchase, the proportion of bone and fat, the credit value of the wool taken from the carcase, the cost of hay or the rent of grass land; while the greatest difference in the cost would be due to whether the meat was to be eaten for the mid-day meal or kept for a late meal after one returned from the theatre? Mr. Phillips pleaded strongly to the supply authorities to "commercialize" their present "scientific" tariffs, or at least make an endeavour to educate the prospective consumer by giving one or two practical examples on their literature—"somewhat on similar lines to those adopted by the gas companies, although their system of charges was less complicated."

Hatching by Electricity.

Intensified poultry farm production was quoted recently by Mr. Edwin Seddon, Engineer and Manager of the Edinburgh Corporation Electricity Department, and Chairman of the Scottish Centre of the Institution of Electrical Engineers, as an outstanding example of how electricity is being applied in Scotland to enable home industries to compete successfully with imported products. He gave details of a poultry farm at Corstorphine—reputed to be the largest of its kind in the world operated by electricity—where the stock was increased two years ago to 200,000 laying hens. Electrical energy is distributed throughout the farm for steam raising, heating and power, and light. The steam, having reached a pre-determined pressure, is automatically admitted to a thermal storage accumulator. This accumulator has pressure regulators and valves, and emits low-pressure steam which is used for heating the brooder houses. As the laying hens are kept for only two years, it is necessary to replace about 100,000 annually, and to ensure this number of selected pullets 300,000 chicks have to be hatched in a season of some three months. For hatching purposes, nine large electric incubators are provided, each capable of holding 16,000 eggs. These are fitted with devices for periodically reversing the angle at which the eggs lie. The incubators are maintained with thermostatic control at a temperature between 99½° and 100° Fahr. A useful purpose, for which, as we have pointed out before, gas has also successfully been used for a good many years past.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany.

THE THERMAL EXPANSION OF REFRACTORIES.

An important paper by R. V. Widemann, A. Jourdain, and H. Cassan on the subject of the thermal expansion of refractories appears in Journal des Usines à Gaz, 1930, **54**, 541-551 and 579-583 (Nov. 20 and Dec. 5).

The expansion curve of a refractory material under the influence of heat is not as simple as that of a bar of metal. In addition to the true thermal (reversible) expansion, there may be permanent variations in dimensions due to physical or chemical changes occurring in the constituents of the bricks. Thus an aluminous brick may show a change of length equal to zero or even a negative value at a high temperature, due to after contraction counteracting the true thermal expansion; and a badly converted silica brick will show an exaggerated expansion due to the permanent expansion consequent on the conversion of the quartz present in it.

A knowledge of the expansion curves of bricks renders it possible not only to prescribe definite conditions for the use of the bricks but also to control their manufacture in the sense of regulating the heating and cooling schedule to a maximum rate in harmony with the necessary precautions in critical temperature ranges, especially in the case of silica bricks.

Three general methods are available for the study of thermal expansion—namely,

(1) Methods based on the differential expansion of the material compared with a material of known coefficient of expansion.
(2) Methods based on direct reading by use of a recording device or a graduated scale in conjunction with an appropriate system for magnifying the expansion.
(3) Methods based on the use of telescopes to observe the movement of gauge marks attached to the specimen, the telescopes being provided with micrometer scales in the eye-pieces.

The latter method, which renders it possible to obtain data at high temperatures, has been used in the present investigation. The apparatus is described and illustrated, as are also various forms of apparatus of all three types which have been employed by other investigators.

Expansion curves up to 1600° C. are shown for a large number of bricks comprising silica bricks (English, French, and German), firebricks ranging from siliceous to highly aluminous bricks, a magnesite brick, a carborundum brick, a bauxite brick, and a fused alumina brick.

As is well known, the form of curve exhibited by a silica brick depends on the extent to which the conversion has been effected during manufacture. With well-converted bricks, the greater part of the expansion occurs below 300° C.; hence great care is necessary in the early stages of the heating up of silica settings. Above 300° C. the curves flatten out. The total expansion to 1400° C. may vary between approximately 1·0 and 1·7 p.ct. The total expansion up to 1000° C. varies with different bricks; but no relationship was found between the expansion and the silica content or the porosity or the specific gravity of the bricks. In the case of silica bricks, curves are also given showing the linear changes which occur during manufacture both in the periods of burning and of cooling. The flatness of the contraction curve during cooling in the temperature range between the firing temperature and 300° C. indicates that cooling may theoretically be carried out very quickly over this interval, though the final cooling must be slow. Nevertheless, the authors disclaim responsibility for any breakages which may occur if this practice is adopted. Test-pieces from the same silica brick tested in different laboratories by different methods gave closely similar results.

With ordinary firebricks, the expansion curves give in many cases a rough indication of the temperature at which the bricks have been burnt since, in the neighbourhood of this temperature, the after-contraction commences to counteract the effects of thermal expansion. In the case of firebricks, those having a high alumina content may show a comparatively steep expansion curve and hence sometimes tend to be rather sensitive to rapid temperature fluctuations at high temperatures. A carborundum brick investigated by the authors gave a very sinuous curve, the total expansion to 1400° C. being 0·8 p.ct. No explanation has been found for the curious shape of the curve. In the case of magnesite bricks, the experience of other investigators is confirmed, the expansion curve, which is almost linear, reaching a value of more than 2 p.ct. at 1400° C. A fused alumina brick was even worse, the curve in this case rising gradually at first to a value of 1 p.ct. at 1150° C., and then with progressively increasing steepness.

The utility of thermal expansion curves was demonstrated by a test carried out on the expansion of a Glover-West vertical retort during heating up to working temperature. The expansion curve of the setting was very similar to that obtained in the laboratory, but was slightly below it, due, on the one hand, to shrinkage of the jointing cement and, on the other hand, to a lag between the temperature of the brickwork and the temperature as indicated by a thermo-couple. Thermal expansion curves, therefore, provide reliable information which may be used with confidence in connection with various aspects in the designing of plant—for instance, in the estimation of the allowance to be made for expansion cavities.

An appendix is devoted to a consideration of the limits of accuracy of the telescope method with reference to the optical characteristics of the lens system.

INTENSIVE COOLING OF GAS.

To the abstract of this paper ("JOURNAL," Dec. 10, 1930, p. 793) a foot-note was appended questioning the accuracy of the figure specified for the cooling rating of the compressor. The correct value is given in "Das Gas- und Wasserfach," 1930, **73**, 1200 (Dec. 13) as 60,000 B.Th.U. per hour, instead of 6000 B.Th.U. which appeared originally.

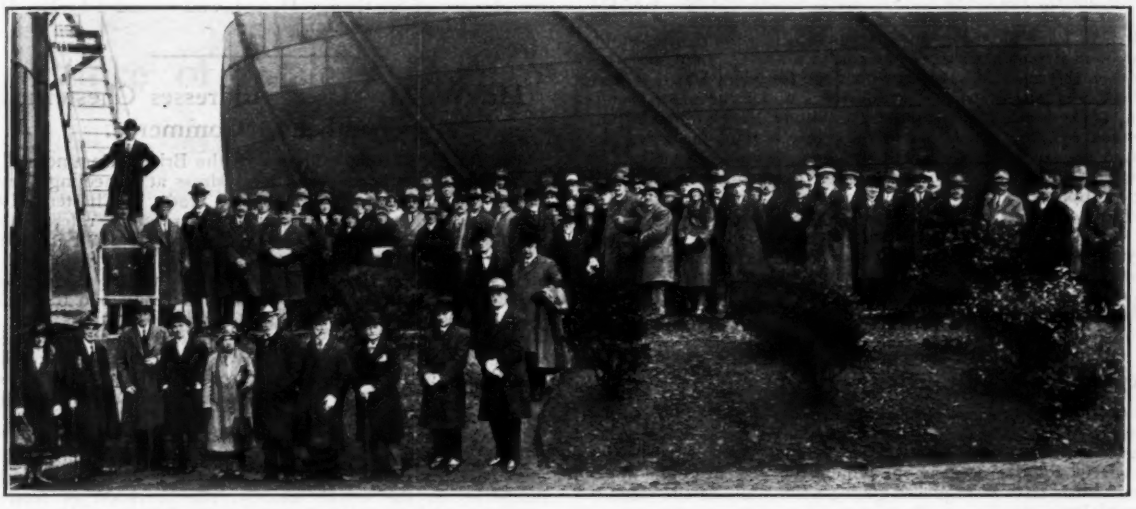
Inauguration of New Gasholder at Colchester

The great progress which the Colchester Gas Company has made, especially in the past sixteen years, was commented upon on Wednesday last, when a new gasholder, which the Company has had constructed at its works at the Hythe, and which practically doubles the storage accommodation, was brought into service for the first time. The ceremony of turning the valve which admitted gas from the holder into the town mains was performed by Mrs. W. Gurney Benham.

The new holder, which is of the "spiral" type, has a capacity of 750,000 c.ft. It has been erected at the gas-works in close proximity to the existing holders, and the work has been carried out in less than twelve months from the time the contracts were placed. The contractors were Messrs. Newton Chambers & Co., Ltd.

Prior to the inaugural ceremony, a large company were entertained at luncheon by the Chairman and Directors of the Company. Proposing the toast of the Colchester Gas Company, the Mayor remarked that the Company was now in its 104th year, and he thought it would be agreed that, especially latterly, they had made remarkable progress—["Hear, hear"]—and were entitled to claim that they were a great asset to the Borough. [Applause.]

Mr. W. W. Townsend, Engineer and Manager, said it was a proud moment for him because that day marked the completion of a scheme of works reorganization which had been in progress during the past sixteen years. The scheme was started at a time when it was difficult to obtain plant and very difficult to obtain money, and they were so hard pressed that they were only too thankful they were able to get new plant running in time to meet requirements. He regarded it as a compliment to the Company that so many representatives of the municipality had attended.



A photograph showing shareholders of the Colchester Gas Company, who witnessed the ceremony, which took place on Dec. 17. Standing on the steps is Mr. W. W. Townsend, Engineer and Manager, who conducted the party on a tour of inspection. The Chairman, Mr. W. Gurney Benham, and Mrs. Benham can be seen on the left of the front row. Over a hundred visitors were present, and a feature of the ceremony was the great interest taken by the shareholders, including quite a number of ladies, in the works, which were fairly thoroughly inspected.

THE NEWS OF THE WEEK

Electric Light Failures in Somerset.—Within one week the electric light has failed at Taunton, Bridgwater, Minehead, Watchet, Dunster, and Williton. At Watchet this trouble has occurred on three Saturday evening in succession, shopkeepers having to improvize lights by means of candles.

A Reduction in the Price of Gas has been decided upon by the Sedgley Urban Council Gas Committee. This reduction will be 6d. per 1000 c.ft.—from 3s. 9d. to 3s. 3d. The charge to ordinary consumers will be 9·18d. per therm instead of 10·6d., and the gas to slot consumers will be 19 c.ft. a penny instead of 17, equivalent to 12·3839d. per therm. No change is to be made in the calorific value, which is 425 B.Th.U.

The Society of British Gas Industries.

A Meeting of the Council was held at 56, Victoria Street, Westminster, S.W. 1, on Dec. 16—Mr. FRANK WEST, Chairman, presiding. Those present were: Mr. F. J. Gould (Hon. Treasurer), Dr. E. W. Smith, C.B.E., Messrs. C. A. Goodall, B. B. Waller, W. H. Handley, F. C. Tilley, H. E. Bennet, T. O. Wilton, H. M. Thornton, J.P., R. J. Milbourne, J.P., L. Hartley, Ernest West, C. R. F. Threlfall, E. J. Davison (Hon. Secretary), and Arthur L. Griffith (Secretary). Apologies for absence were reported from Messrs. E. J. Fox, D. M. Gibb, T. A. Clapham, R. B. Hodgson, and Col. E. A. Wilson.

The Chairman referred in feeling terms to the death of the following members:

John A. Macleod, Director of Parkinson & Cowan, Ltd.

Walter Grange, Managing Director, Foster & Pullen, Ltd.,

and at his request the members rose in their places as a mark of sympathy. Letters of condolence had been sent by the Secretary.

Mr. W. J. D. Howell, Chairman of the Coal Section, and Dr. E. W. Smith, C.B.E., were nominated as the Society's representatives to attend the Conference on the "Nomenclature of Sizing" relating to coal, which is being arranged by the British Engineering Standards Association.

It was reported that satisfactory progress was being made between the Home Office and Section IV. in regard to safety precautions in repair of gasholders.

The following were re-elected the Society's representatives on the Grand Council of the Federation of British Industries:

Group XV.	1. Gas Appliances— (1) Gas Mantles (2) Gas Fittings	Mr. F. C. Tilley
Group II.	5. General Mechanical Engineering	Mr. E. J. Davison
Group II.	12. Coke Ovens, Gas Conveying, and Chemical Plant	Mr. Samuel Cutler
Group II.	13. Heating and Cooking Apparatus.	Mr. Charles Clare

THE NEWS—continued.

Co-Partnership at East Surrey.

The General Meeting of Co-Partners of the East Surrey Gas Company took place at Redhill on Dec. 4. Mr. G. R. Hunt presided, and those present included Messrs. W. Lees Stenning, J.P. (Chairman of the Company), W. H. Bennett (Managing Director), Harrie Stacey, F.S.I., J.P., R. H. Mew, F.R.I.B.A., and J. Urquhart (Directors), Horace Long, F.C.I.S. (Secretary), Ernest Scears (Engineer), and Arthur Tennant (Sales Manager).

The Co-Partnership Committee, in their report, stated that the number of co-partners at June 30 last was 213. The bonus and interest for last year amounted to £1835, an increase of £211. Much progress was shown on the savings account, and during the year for the first time the amount reached four figures—namely, £1072, an advance of £267. Co-partners had invested in the Company's capital stock during the year the sum of £2007, and the stock registered under the scheme up to June 30 last amounted to £9695. Transfers of stock after that date had increased the total to £11,580, an advance of £1420, divided among 199 co-partners holding, on an average, £58 per head.

Mr. W. Lees Stenning, in the course of an interesting statement, said it had been in the minds of many of them that this would be the last occasion on which the founders and members of the Co-partnership Fund would meet under the usual conditions, as they anticipated that the amalgamation with Croydon, approved by their stockholders as a fair arrangement for the consumers, stockholders, and employees, would take effect at the end of this year. It had, however, been intimated to them that the Board of Trade would only give its approval to a modified form of agreement which would impose such conditions as they could not recommend them, as stockholders, to accept. They possessed an undertaking and a district which were full of development and progress, and with their continued goodwill and co-operation, he felt sure they might look forward with confidence to continued prosperity.

Street Experiment with Six Types of Lighting.

The Birmingham Corporation are making use of old tramway standards for an experiment with types of gas and other forms of lighting. The road chosen is the Hagley arterial road; and in each of the six sections in which the test is being made notice boards have been placed giving particulars of the various types of lamp used.

The experiment is creating a great deal of interest among both motorists and the general public, following, as it does, the recent test at Lewisham, when experts decided that high-pressure gas-lamps were both the cheapest and brightest form of street-lighting.

Britain's Need for Non-Skid Roads.

A resolution urging the importance of providing British roads with non-skid surfaces has been sent to the Minister of Transport by the National Committee of the Passenger Service Group of the Transport and General Workers' Union.

More than 100,000 transport workers, including 'bus and motor-coach drivers, are represented by the group, which has taken this action as a result of the increasing number of accidents which have been reported by their members as being due to slippery roads.

"Many of our members are experienced drivers," said Mr. Harold E. Clay, the Secretary, "and after hearing their views we have come to the conclusion that it is the material used on the roads which is largely to blame. We believe that tar-sprayed roads with good-sized chippings lightly rolled in provide the safest surfaces. Roads which are shiny and smooth are most dangerous."

Gas and Electricity on L.C.C. Housing Estates.

At a meeting of the London County Council on Dec. 9, Admiral Cuthbert Hunter (Greenwich) asked the Chairman of the Housing Committee how many of the Council's pre-war and post-war houses and tenements were lighted by gas and electricity, how many were fitted with gas for cooking and heating; in how many houses electricity was used entirely for lighting, heating, and cooking; how many were situated in the district served by the South Metropolitan Gas Company, and how many of these were served by gas and electricity.

Mr. E. M. Dence (Chairman of the Committee) replied that he understood that Admiral Hunter in all his questions was referring to houses and tenements, and his reply was based on that question. The number pre-war supplied with gas lighting only was approximately 8660 and post-war 29,000. Electric lighting only, pre-war *nil*, post-war 11,500. Gas and electricity together, approximately, pre-war 1350 and post-war *nil*. In the case of the 1350 houses and tenements, electric lighting had been introduced since the war. All the Council's pre-war and post-war tenements were fitted with gas for cooking and heating except 194. The number of houses where electricity was used entirely for lighting, heating, and cooking was also 194. The number of the Council's houses and tenements in the South Metropolitan Gas Company's district was, pre-war 1547, post-war 6296, and those served by gas and electricity were, gas only for cooking and lighting pre-war 1456, post-war 5685; gas for cooking and electricity for lighting, pre-war *nil*, post-war 497; gas for cooking and lighting and electricity for lighting, pre-war 91, post-war 114. In the case of 91 pre-war houses mentioned, electric lighting had been introduced since the war.

The Council adopted the following resolution:

> That it be referred to the Housing Committee to report as to the method of lighting, cooking, and heating in the Council's dwellings, and, further, to consider and report whether it would be practicable, in the case of all new dwellings of the Council, to afford each tenant the choice of either gas or electricity for lighting and/or other purposes.

The resolution was moved by Admiral Cuthbert Hunter (in the absence of Sir George Hume), and seconded by Mr. H. P. Latham (East Lewisham).

Mr. W. M. Mason Addresses Chesterfield Chamber of Commerce.

Mr. W. M. Mason, Manager of the British Commercial Gas Association, in the course of his address at a meeting of members of the Chesterfield Chamber of Trade, at Chesterfield Corporation Gas Department's showrooms recently, referred to the bewildering ramifications of the gas industry and its connection with public service. It was closely allied with coal and all its romances. It was the industry which made possible the wonderful bye-products of coal and really laid the foundation for dyes, artificial manures, road preparations, and endless other products. In the realm of hygiene and public health it could also be classed as a universal servant, assisting in all manner of ways those who were keenest to secure a better atmosphere as well as general health conditions in the home and factory.

One of the reasons for the remarkable development of the gas industry and for its retention in popular service was undoubtedly the fact that it was associated with the two oldest industries in the world—namely, the provision of food and shelter for mankind. In its world-wide interests, wherever gas was available it had been gradually adapted to the needs of the home in the provision of easy and convenient heating for the preparation of food, the adequate and easy adaptation of heat for warming purposes, as well as the provision of a clean, comfortable, and healthy lighting medium.

With the march of the times, two essentials to modern comfort were beginning to emerge—namely, the silent house which was making its appeal as a sort of "city of refuge" to the nerve-racked modern city dweller, and the automatic house where the modern application of gaseous fuel had eliminated drudgery and much of the disagreeableness associated with cooking and heating, and had substituted the scientific, easily controlled and much more reliable smokeless fuel. This was reflected in the fact that where gas was available, quite 90 p.ct. of the population gladly availed themselves of its use.

The modern spirit in the gas industry was also that of service. The progressive minds among gas administrators realized that although a great public utility, gas business could only be permanently successful if its conduct was consistently and persistently directed to securing the satisfaction, confidence, and friendship of the customer.

Aldershot Gas, Water, and District Lighting Company.

The shareholders of the above Company assembled in Extraordinary Meeting on Thursday, Dec. 18, 1930, at the Farnborough Offices of the Company for the purpose of considering, and if thought fit approving, applications to the Electricity Commissioners for Special Orders under the Electricity (Supply) Acts, 1882 to 1928, authorizing the extensions of the electrical limits of supply of the Company and the expenditure of the capital of the Company. At a further Extraordinary Meeting, the Chairman, after explaining the objects of the Bill the Company had deposited in Parliament, moved:

> That the Bill intituled "A Bill to extend the limits of the Aldershot Gas, Water, and District Lighting Company for the supply of gas; to change the name of the Company; and for other purposes," a print of which is now submitted to the Meeting, be and the same is hereby approved subject to such alterations as may be made therein by Parliament and approved by the Directors.

The motion was seconded by the Deputy Chairman and unanimously passed.

An Original Idea at Douglas.

If originality be the keynote to success in advertising, says the " Isle of Man Examiner " for Dec. 5, the Douglas Gaslight Company is marching along the high road towards flourishing business and unbounded prosperity. The enterprise of the Manager of the Company, Mr. A. R. Bissett, has been apparent in many novel and attractive schemes at the showroom in Victoria Street, Douglas, and his latest display, it is stated, has arrested public attention in a way that compels admiration.

Arrangements were made some time ago for a series of public demonstrations in cooking to be given at the showrooms, and a plan was evolved to excite public interest and ensure good attendances. Experience has repeatedly proved that the bald announcement of such an event rarely suffices to attract big crowds. Thus appeared the unusual announcement of the opening of " the New World Theatre " at 51, Victoria Street, Douglas, with " A Radiation " presenting the wonder anti-labour play, " The Better Way," featuring Miss E. K. Eason, the Manx star.

As was to be expected, the " theatre " was packed as soon as the early doors were opened, and a huge crowd congregated in the street. Miss Bowden, a member of the Millane Players of the Grand Theatre, opened the proceedings by speaking briefly of the uses of gas and the advantage of knowing how to use it with the best results. Miss Eason then stepped forward to play her part, and demonstrate the art of cooking. The stage was also occupied by Mr. R. Q. Hampton, a Director of the Gas Company, and Mr. Bissett.

The stage was set to represent a Manx kitchen, and Miss Eason, surrounded by a variety of the latest types of gas cookers, " performed " at 3.30 and 7 p.m. daily.

Prince of Wales's Call to British Trade—Wake Up, Consider, and Act.

A brilliant function was the annual banquet on Dec. 16 of the Incorporated Sales Managers' Association, who were on the occasion honoured by the presence of H.R.H. the Prince of Wales, K.G. The President of the Association, Sir Francis Goodenough, C.B.E., was in the chair, and the banquet took place in the Guildhall, which, as the Prince said, is " the very heart of the commercial centre of our Empire, where the great Corporation and the great Livery Companies, and the individual merchants of the City, have always given their energetic and generous support to every movement for the benefit of Commerce." The 850 persons present included the Lord Mayor and Sheriffs, and a great number of other distinguished guests.

Proposing the health of His Royal Highness, Sir Francis remarked that, if the efforts of Sales Managers to raise the standard of efficiency in British marketing, at home and overseas, are to meet with full success, the Sales Managers must have behind them the unremitting interest and thorough backing of their Directors and Management—and that is not yet by any means universally realized. He stated that the Committee on Education for Salesmanship are now in process of drafting their final report, and hope to issue it early in the New Year.

Face Facts.

In the course of his response to the toast of his health which the Chairman had proposed, the Prince of Wales, referring to our export trade, said : " We all want to make progress, and would be by no means content just to stand still. Instead of doing either, however, we have, for several years, been losing ground. Now I know that some people hold it wrong to say that, in case our competitors and our customers should hear, and should think we are going downhill, and are throwing up the sponge. These people would prefer to change the subject, but, gentlemen, isn't it rather better to face facts than to ignore them? The trouble, as I see it, is that we here at home are sometimes the last to realize these things, which are the common talk of our brothers overseas, of our foreign competitors, and of the customers we fail to capture or retain. So let us frankly bring these facts to light and discuss them—not for the purpose of moaning over them, but of facing them, ascertaining their causes, and then overcoming all difficulties, as our fathers did before us, and as we most certainly can and will. We have all got to realize that the world markets of to-day are not those of the times of Queen Victoria, nor even those of Edward VII."

" As the Salesmanship Committee have, of course, been careful to point out, there are many firms in this country whose up-to-date methods of salesmanship, like their up-to-date goods, are equal to the best in the world. Indeed, the best of our men and the best of our goods are unsurpassed. Our troubles, no doubt, are in part due to world economic and political conditions over which we have little control. Granted that they are, is that any reason for neglecting other causes which we can directly control or remove? Is it not rather a call to us to do everything we can to counterbalance the adverse factors imposed upon us?"

" I think we are all too prone to-day to think that combined action lessens the need for individual action. Combined action should be a supplement and support to individual effort and enterprise, not a substitute for it."

" What we need is to realize that our best men must not be concerned only, or even mainly, with production. Modern methods of production—modern conditions of competition—inevitably demand modern methods of marketing. A goodly share of the best available brains must be concentrated on the difficult, complex, but most interesting job of fighting competition in the world's markets."

" Training is absolutely essential to-day, if you mean to keep in the first flight. You must be skilful and fit as you can be made. To your inborn abilities of mind and gifts of personality must be added broad-based general culture, and also the special knowledge which is essential to the man of commerce. That, I suggest, includes knowledge of economic history; of economic geography; of world industrial, commercial, and financial conditions; and knowledge of languages. I am very glad to think that the Committee in their final report will be dealing fully with this vital problem of how the youth of this country can most effectively be trained for commerce, without loss of general culture. And not only without loss of culture, but with the definite advantage to a man of being conscious that his culture can be made serviceable to his day and generation as certainly through commerce as through any other profession—conscious, moreover, that any gifts of leadership and initiative, originality, and courage he possesses can be utilized to the full in the honourable service of commerce, in which the straight man will always beat the crooked, if he has equal capacity, training, and keenness."

" But there is one condition that must be fulfilled, if the efforts of the Committee and the response of teachers and parents and sons are to avail the nation. The employers engaged in the struggle for world trade must recognize the need for employing a more adequate and a more appropriately educated staff, if British trade is to live and grow, and not to wither and die. And they must make it clear beyond a doubt that for such staff they are prepared to pay an attractive price and give them in their work abroad adequate financial backing, so that they may have a standing as well as an efficiency worthy of their country. They must, moreover, courageously and steadfastly back them up by policy based on the needs of to-day rather than on the traditions of former years and wholly different times."

" Here, in this Guildhall, where my Father a generation ago besought England to 'Wake Up,' I appeal to the leaders of British Trade to 'Wake up thoroughly, to consider fully, and to act decisively.'"

The toast of " Commerce, Industry, and Education " was submitted by Lord Eustace Percy, who thus concluded his remarks : " We politicians desire to mobilize commerce and industry, and in this we are right, though we may be clumsy in our methods. Let business men, instead of giving way to the natural temptation of telling us to mind our own business, make the appropriate reply : let them insist on mobilizing education."

Sir Arthur Balfour, Bart., K.B.E., and the Rev. C. A. Alington, D.D., Head Master of Eton College, responded. Sir Arthur Balfour said that this country had some of the finest salesmen in the world. How was it that with those fine salesmen and that fine direct selling which we had been developing we were unable to retain our share in the world's trade or increase it? The answer was a very simple one. Our costs were too high, and until we faced that fact all the talk of fine salesmanship was merely breaking the hearts of those we sent out to sell goods, the price of which was too high.

Sir Charles P. Trevelyan, Bart., M.P., proposed " The Lord Mayor and Corporation of the City of London," while the toast of " The Visitors " was entrusted to Mr. John Ames, Chairman of the Incorporated Sales Managers' Association.

THE "JOURNAL" TECHNICAL RECORD

Which also contains Full Reports of Meetings of Gas and Allied Associations ———

Practical Application of the Principles of Rate Making.

Report of the Sub-Committee of the American Gas Association: G. I. Vincent, *Chairman*; Ira Craig, D. A. Henry, E. N. Strait.

Inasmuch as this subject has been covered a number of times, your Sub-Committee does not expect to sound many original notes. Rather, it will attempt to review the subject, involving some repetition, and endeavour to lay particular emphasis on a few basic principles.

The Present Problem.

Almost without exception modern practical rate making is improvement of the rate forms which give practical effect to the economic factors involved in sale of gas. Its purpose is the development of the largest volume and greatest extensiveness of gas service consistent with an adequate coverage of the cost of service.

Study of sale of gas to customers reveals that the gas sales to different classes of customers have different characteristics in relation both to the influence of the class upon the cost of supplying it and the value of gas service to the customer. The practical application of the principles of rate making finds its bearing here in a practical reconciliation of the cost of service and the value of service.

This we believe is a simple statement of the problem. The solution may be different in every gas utility, but the general principles apply to all. It is, however, impossible to lay down specific rules to follow, but your Sub-Committee proposes to discuss the procedure generally, feeling that an understanding of the basic principles will be helpful in rate improvement. Regardless of the form of any proposed rate, the tendency should be to give the benefit of lower costs to those customers to whom the utility company's cost of service is in fact lower. There is also usually involved in making general rate improvements the problems of increasing charges to customers who are receiving service at less than the actual cost.

There are in general four steps in the establishment of a better rate:

1. The determination of competitive costs (particularly of the most competitive classes).
2. The analysis of cost of service.
3. The formulation of the practical rate.
4. The establishment of the rate in the community.

The fourth is not a part of this Sub-Committee's assignment except as involved with the other three steps.

The Analysis of Cost of Service.

There has been misunderstanding as to cost analysis in both the gas and electric industry. A cost analysis following the principles heretofore laid down by the Rate Structure Committee is not a rate, was never intended to be a rate, and probably never will be. It is a method of measuring with reasonable accuracy the cost of service to various classes of customers. The method and principles applied at a given period to any utility by two or more competent analysts will yield results in entirely satisfactory accord. An interesting example of the use of a cost analysis is in the recent growth of space heating involving the making of rates for this purpose. Without a cost analysis and a knowledge of the trend of the art of gas production and distribution it would be impossible to make an economically sound rate for this utilization. Another obvious use is as an aid in the determination of marginal and increment costs, useful in the study of possible additional industrial business.

But to reiterate, a cost analysis is not a rate. Rates should collect costs, and total costs are measured in dollars no matter where they fall in the cost allocation. The equitable rate which recovers these cost dollars, with satisfaction to the customer and greatest development of the business, is the solution needed.

The Sub-Committee feels that no further discussion of a cost analysis *per se* is necessary. Certain improvements will undoubtedly be offered from time to time to increase the accuracy of this reasonable measure of the cost of service which a cost analysis will yield.

Determination of Competitive Costs.

By competitive costs in relation to utility service is usually meant the cost to the customer of obtaining a reasonably satisfactory substitute service. Sometimes the substitute occurs through existence of more than one like utility in the field of service. Usually it takes the form of service produced by the customer through fixed investment in a plant to produce the service and through current outlays for materials and labour for its upkeep and operation. Sometimes the potential business is not as yet in existence, for its development may be dependent upon the cost of utility service as a factor in the ultimate cost of the customer's product which must meet the competitive conditions existing in other fields of production. In the case of some classes of service, the cost of a substitute service is not a factor, but the economic basis upon which more liberal use of service occurs takes its place. Whatever may be the nature of the sales resistance to the rate that has been based upon an analysis of the cost, the degree of it should be determined as fully as possible, for it is quite certain that no large development of business can occur where the rates exceed the value of service.

It is not usually necessary to enter into a study of the problem of competitive costs for all classes of service, inasmuch as it is frequently known from experience that rates under consideration for some classes are sufficiently low to avoid the effects of cost of substitute service. Industrial business is the class in which competitive costs constitute most frequently an important factor in rate-making. Information relating to such costs is best obtained from existing installations not operated with utility service. The facts are usually analyzed on the basis of the additional cost to the customer producing the substitute service. Often allowance can be made, in comparison of costs, for the greater efficiency in the use of utility service in the customer's business.

Formulation of the Practical Rate.

As indicated, formulation of the practical rate represents a reconciliation of the analysis of the cost of service and the competitive costs. It may also take account of the changes which would probably occur in the analysis of costs upon material expansion of the business. This would be important where a contemplated rate would evidently secure a large volume of business either through obtaining many new customers or large industrial loads. This is mentioned as being important in such instances, as it is quite evident that the results of an analysis of cost of service of a small company would not necessarily fit the conditions of a larger business.

Where the rate for some of the service is permitted to deviate in level from the theoretical determination of the cost in order to take account of the value of service, or of the competitive costs which must be met to secure that class of business, some account of this situation must be taken in determining other rates. This may be done by ascertaining what the other rates would be if the business which is subject to competitive costs were not served by the utility.

There are other factors, too, which often must be taken into consideration in the practical application of the principles of rate making, depending upon circumstances in each case. No attempt will be made to enumerate what these may be, except to say by way of example that existing rate forms, the history of a situation, and the relative importance of different factors of cost for different classes of service sometimes have their bearing in the practical determination of a rate schedule.

When we think of practical rate schedules as applied to a modern gas utility, we usually make four divisions: (1) Resi-

dential; (2) space heating; (3) commercial; and (4) industrial. Sometimes these are all covered by one schedule; sometimes there are several classifications in each division.

Residential Service.

Beginning more than ten years ago, it was pointed out that the straight meter rate for residential service was inequitable. Somewhat later, and certainly before actual experience had substantiated the statement, it was stated by several far-seeing utility executives that the straight line meter rates would contribute to a falling off in the residential consumption. Whether or not these statements were predicted on a visualization of the impending changes in our social and industrial life is of no moment. The facts are that such changes have taken place, and there are now economic as well as ethical grounds for changing residential gas rates from the old straight line form.

There will not be a unanimity of opinion as to the best form, but again certain general principles can be stated, and, if proof were needed, it will be found in the sister industry. The electric industry, with its old relatively high commodity prices in its straight line or slightly blocked residential rates, observed the necessity of changing the form in order to give customers a better price for greater utilization and better characteristics. Therefore, we find all over the country the residential electric rates being changed from straight line or block rates into some form of two-charge rate with a material reduction in the commodity price. The National Association of Railroad and Utilities Commissioners at its 1929 meeting made the definite recommendation that the electric residential rates be so changed. The gas industry is in far greater need of such a change than is the electric industry. It is highly probable that the lack of rapid progress is due to psychological rather than economic objections.

Almost invariably it is necessary in changing from a straight line to the better form of rates to increase slightly the bills of a number of the customers, not infrequently, a majority of the customers. These increases are, of course, made on those customers that are now not paying their way. However, it results in an understandable hesitation on the part of the utility in anticipation of an unfavourable reaction from the community. It is not unfair to state that this hesitation has not always been justified. Opportunities to improve rates for the mutual benefit of the customer and the utility have not infrequently been missed because of an over-emphasis of a danger that was really non-existent. The matter of the rich and poor customers has been thoroughly discussed by other studies of practical rate making and rate installation.

All these facts have given rise to several expedients, among which is the optional rate. This has been heretofore discussed by the General Committee and an opinion given and approved (see page 78, 1928 Proceedings, American Gas Association). Therefore your Sub-Committee does not feel that it is necessary to review the subject.

Experience indicates that the best form of gas rate for residential service is on the order of the two-part rate, including in the first part some portion of the customer and demand costs, the balance of these costs to be included in the commodity charges. The criterion of a good commodity cost is one that will best lend itself to additional utilization from the customer, and obviously will vary in different communities. However, if we accept the fact that in changing to such a form of rate, it is necessary to increase the cost of service to those customers not paying their way, it is highly probable that in the long run the higher the fixed rate, and the lower the commodity rate within reasonable limits, the greater value the rate will be to the community.

We think, therefore, of a first charge something on the order of $1 to $2 per month, followed by a commodity rate to yield the desired revenue. The size of the community would be a rough measure of the fixed charge. The commodity rate may be blocked if necessary. If sufficient revenue can be obtained with a commodity price low enough to meet the competition, no blocking is required.

If the change in rate is not to yield substantially the same revenue as the straight line rate, another problem is involved which is not in the province of this Sub-Committee's discussion.

If the problem is thus as simple as stated, we can well ask ourselves what possible use can there be for a cost analysis? A cost analysis will have shown first the total revenue required from the residential customers as a group. Secondly, it will have shown the average fixed monthly cost per customer, and the commodity cost to yield the total revenue. It will have shown that the fixed monthly cost is very much higher than we propose to charge in our rate. This should be useful in substantiating the desirability of the proposed fixed charge.

It would probably make the installation of our new rate a little easier if this fixed charge could be varied with the demand characteristics. There are, however, no methods which we could use without adding to the complication of the rate, and there is no question that the simpler the schedule can be made, the better it will be in the long run. The use of the area or counted room or similar methods, as frequently applied in the electric industry, have not been adopted to any extent in the gas industry. Space heating is not being considered in this part of the discussion. The large and elaborate household can be expected to create a higher demand than will the small dwelling with the same equipment. One interesting method of varying the first costs has been advanced, and while not by any means an accurate measure, will, upon examination, show that it would have a community usefulness in establishing the rate. Using the suggested dollar per month first cost as an example, it was proposed to create a customer demand unit rate of 25 cents per unit per month, each kitchen rated at three units and each bathroom one unit, not less than four units for any customer. Your Sub-Committee does not advocate this method, but offers it to show that real and constructive thought has been given to the problem. Note that it would fit nicely into the space heating rates by adding units based on the installed capacity and blocking down the commodity.

Nothing has been said about the inclusion of any commodity in the first charge. This does not affect the problem, and is to be decided by local conditions. Usually, the including of some commodity renders the community angle of the rate installations a little simpler, but, of course, it makes to increase the follow-on commodity price.

Your Sub-Committee's suggestion is, therefore, that gas rates for residential service be of a two-part form with a fixed monthly charge of not less than $1 varied slightly with the demand if practicable and including some commodity if desirable and followed by a straight line or slightly blocked commodity rate. If necessary to block the commodity rate, the first block or blocks should be small in order quickly to reach a relatively low commodity rate, particularly for automatic water heating.

Space Heating Rates.

The necessity of a cost analysis to determine proper space heating rates has already been mentioned. The characteristics of space heating are so definitely known that, from the standpoint of cost and revenue only, gas could be sold for this utlization on a straight line rate. However, the only alleged advantage of such a rate—that of simplicity—is more than offset by its disadvantages. It obviously departs from the basic principle of a two-part rate, which we are so earnestly trying to establish, and, if the commercial and industrial service is being rendered on a block schedule, a straight line space heating rate will probably be less than one or more of the first blocks. An examination of the rate list indicates that some form of two-part rate is being used in the majority of space heating schedules. There also is a tendency to use the 24-hour demand as a basis for the demand charge rather than the hourly demand. While the demand is being measured in a few locations, it does not seem to be necessary.

In some instances the space heating and other residential service have been combined in the schedules. Such combination schedules can be so designed as to give to the customer who buys total space heating the benefit of a lower rate for his base load utilization. This method may be made useful in the promotion of space heating.

The Sub-Committee does not believe it is necessary to make any definite recommendation, but suggests the following, assuming that the required revenue has been properly worked out from a cost analysis, and a study of the future growth of the business—a two-part rate with the first part based on the 24-hour demand followed by a straight meter rate for the commodity. It is also suggested that all service be included in the residential space heating rate.

Commercial Service.

All gas service is competitive, but in the commercial and industrial field it is obviously and directly competitive, and, therefore, we are coming more and more to study our rates from this standpoint and developing our schedules to meet the competition and secure additional business.

Included in the commercial business is some of the best load factor utilization which will be found in the industry. The strict application of the costs shown by a cost analysis might be expected to show that these customers were paying a larger return than others under the same classification. But there will be no apparent necessity for lowering the rates to such customers, because they will usually be found to be paying contentedly the cost of the service, as anything they would substitute would cost more. There is no better illustration of one effect of competition and of the fact that rate making is a practical enterprise.

It is largely for this reason that, speaking generally, a block rate is best adapted for commercial service. The general price level and length of the blocks of rates can be determined by reference to a curve of the variation of cost as reflected by two-part costs shown by a cost analysis. A block rate may be preceded by a fixed monthly charge to cover a portion of the customer and demand costs, in which case the level of the block rate charges will be lower.

Industrial Service.

This is, of course, by far the most highly competitive division of the gas business. Moreover, the customers are relatively

few, so that it is usually possible to study the individual characteristics of each. There is also usually introduced the problem of the growth of present customers and addition of new customers both in volume of consumption and load characteristics. This is aptly illustrated by a statement made by one member of your Committee which has been given some publicity.

Assume a gas utility producing or purchasing coal gas for most of its firm load and producing the balance of the firm load and peak load on water gas. That utility would be justified in taking on additional firm load industrial business based on the marginal cost of water gas, provided, as would usually be the case, that this marginal cost was less than the increment cost of coal gas. This statement of fact, however, immediately indicates the dilemma that is found practically throughout the manufactured gas industry.

Dividing the business into three parts, it will always be found that a substantial number, usually a majority, of residential customers do not pay their way, and that the deficit is made up of the minority of residential customers and industrial and commercial customers paying more than their share of cost. There will always be found in any community of any size available additional business from present and new industrial customers which could be sold at a profit, although at a materially lower price than the scheduled rates. But then it would be necessary to reduce the rates for the present service. This does not appear to be practicable unless the additional profit is at least equal to the loss of earnings from present business resulting from a rate reduction. These are problems that are likely to be found in some degree in almost every case, and for the present there appears to be no adequate means of avoiding them. These problems are not new, and are certainly worthy of the best thought in the industry.

In the large majority of gas utilities, the block rate is used for industrial service. There being no incentive in the rate to improve the load characteristics, the load factors will usually be found to be bad, and, therefore, making very difficult the problem of changing to a better form of rate. Moreover, the industrial gas utilization is quite different from the electric industry in its competitive characteristics. The electric customer would be required to make a very large investment if he furnished his own energy and therefore will readily agree to pay a substantial demand charge at least equal to the fixed charges on his investment. In gas competition, for example, oil, in which the customer's investment is obviously nominal, an unfavourable reaction is likely to be provoked if the rate includes a demand charge based on an analysis of the cost of service, regardless of the fact that the commodity cost would be very low. On the other hand, a reasonable facility charge based on customer cost and some of the demand characteristics should be conducive to the promotion of additional business from new customers with good load factors.

The magnificent growth of the electric industry has been founded on industrial rates. Perhaps we can draw some suggestions for improving industrial gas sales through better rates from what has happened in the sister industry. We find in very many electric utilities a wholesale or industrial classification usually of the Hopkinson demand type with both the demand costs and the commodity costs block and not infrequently a large number of blocks in both; but if we go further we find that there are not infrequently a number of stipulations, so that in effect the classification is not one but is in a sense a base classification combined with a number of class rates. It is, of course, true that many electric utilities have their class rates in separate classifications sometimes frankly developed to secure only one kind of utilization. It would seem that the same principles could well be applied to the industrial gas rates, and we would arrive at a two-part rate with a blocked demand charge materially lower than the costs which would be shown by a cost analysis and a blocked commodity rate in which only the lowest block would approach the commodity cost as shown by the analysis.

Included in the classification, or, if it seemed desirable, in separate classifications, would be stipulations enabling the utility to take on highly competitive business which would be profitable, but which would not fit the general rate. One example is the neighbourhood bakery which utilizes gas during the daily off-peak period. The characteristics stipulated would be then that customers using gas only between certain hours of the day would have the demand charge omitted or reduced. Similarly for seasonal use, of which an example would be the apartment house using gas for water heating during the summer months and possibly space heating in spring and autumn, without going into detail as to the language, a similar stipulation could omit or reduce the demand charges for this kind of a customer.

The suggestion of your Committee, therefore, for improving the industrial rate is to use a two-part rate with a demand charge as large as possible, keeping in mind the practical aspects of the competition. Both the demand charge and commodity charge to be blocked, and, if necessary, a protective minimum, combined either as stipulations in the general classification or in separate classifications, promotional class rates to be provided.

London and Southern District Junior Gas Association

EXTERNAL PRODUCER PLANT AT WANDSWORTH

As was stated in last week's "JOURNAL," two short papers were read at the December meeting of the London and Southern District Junior Gas Association, held at the Westminster Technical Institute on Friday, 12th inst. The first, on the subject of "Refrigeration," by Mr. L. W. Andrew, B.A., B.Sc., of the Gas Light and Coke Company, appeared in last week's issue, while the second is published below.

EXTERNAL PRODUCER PLANT OF THE CHAMBER OVEN INSTALLATION AT THE WANDSWORTH GAS-WORKS.

By E. P. T. CHAMBERS, B.Sc. (Eng.), of the General Manager's Staff, Wandsworth.

It would be impossible for me to do justice, in the short time at my disposal, to such an extensive subject as the chamber oven plant; I therefore intend to confine myself to the external producer unit. A brief description of the whole plant, however, is necessary.

DESCRIPTION OF THE CARBONIZING INSTALLATION.

The plant consists of five settings of six chambers, each holding 3 tons of coal, thus making a total throughput of 150 tons per day for a 14-hour period of carbonization, and a total make of 2,600,000 c.ft. per day.

The chambers, constructed of tongued and grooved silica blocks, are approximately 20 ft. high by 9 ft. breadth by 10 in. width, and are heated by a mixture of producer gas and air burning in four combustion flues situated one above the other between the coal chambers, thus providing accurate heat control of the chambers. The products of combustion, after traversing the flues, pass through the recuperators where the incoming producer gas and secondary air are separately preheated.

Each group of four combustion chambers has its own valve on the producer gas supply main.

There are two external producers of identical type. They are constructed of riveted steel plates $\frac{3}{4}$ of an inch thick, and lined with 9 in. of firebrick and 2 in. of slag wool. The crown is of arched brickwork.

They are fitted with a water jacket at the bottom, which serves the dual purpose of heating the feed water for the sensible heat boilers, and also keeping the base of the producer cool to prevent the formation of clinker. The producers are lagged all round, to a depth of about 4 in., with heat insulating material to reduce radiation losses to a minimum. The internal diameter of the producer is 8 ft. 6 in., and each is designed to gasify 15 tons of fuel per day.

The producers are fed with screened coke up to $1\frac{1}{2}$ in. diameter from an overhead hopper, which is periodically filled by a travelling crane. The charging is carried out through a small hopper with a double sealing device, so that there is no loss of gas during the operation. Each producer is charged in this manner at half-hourly intervals, each charge being one-third of a ton. The fuel depth is 6 ft. 6 in., and the level of the fuel is maintained at 4 ft. 6 in. from the top of the producer, this space allowing the coke to distribute itself evenly over the whole area and also to provide free passage for the evolution of the producer gas, as the off-take is situated at the side.

The mechanical grate, operated by a slow speed steam engine and friction-grip pawl device, acting through a worm gear, effectually breaks up any clinker into small pieces and automatically discharges it with the ash into a suitable receptacle. By varying the speed of the grate, the ash level is maintained at 7 in. above the grate, thus ensuring that the air blast is evenly distributed over the base of the fuel. The normal speed of the grate is about $\frac{1}{8}$th revolution per hour. The ash contains only about 6 p.ct. of combustible matter.

AIR BLAST SUPPLY.

The air blast is provided by a 10-B.H.P. turbo-blower, running at a speed of 3200 r.p.m. and creating a pressure at the producer base of from 3 to 4 in. water gauge.

Exhaust steam from the turbines and liquor pumps is introduced into the air blast, the quantity being regulated to main-

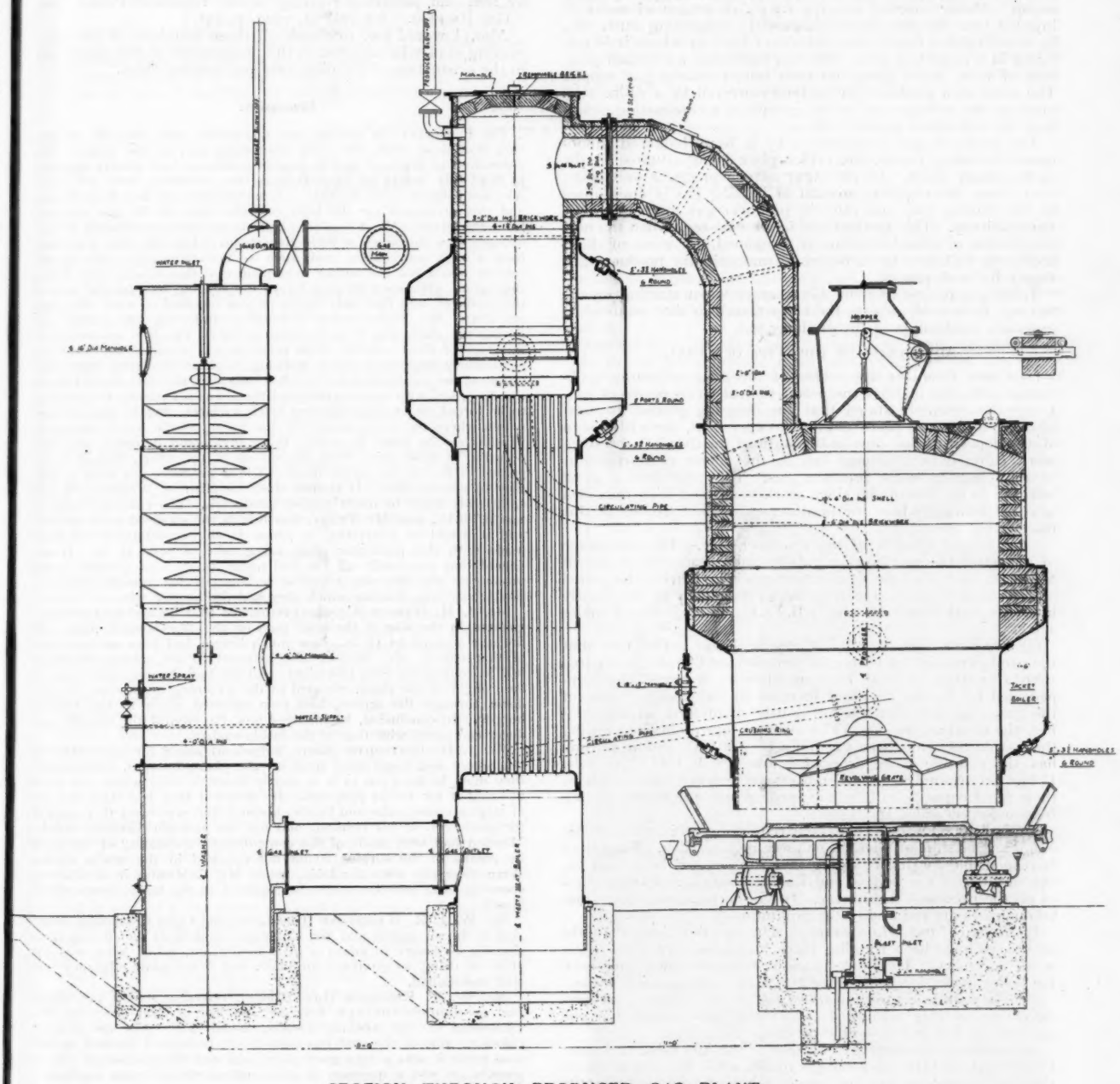
tain a blast temperature of from 50° to 60° C. Occasionally it is necessary to introduce a little live steam; generally, this is when the fuel is coke from a high ash content coal with low fluxing point, such as a Yorkshire coal.

An auxiliary air blast supply is provided by a steam jet blower, this being used when the turbo-blower is shut down for overhaul. In the event of the turbo-blower failing, the reduction of the blast pressure causes a warning signal to sound, and it is only a matter of seconds for the attendant to operate the steam jet blower to continue the supply of producer gas. It is therefore unnecessary to provide storage holders for the producer gas, as a constant supply is maintained. The pressure of the gas at the producer offtake is very slight, being practically level gauge.

From the producers the hot gas passes into the sensible heat boilers—one to each producer. Although similar in principle, these cannot accurately be called waste-heat boilers, as they extract the sensible heat from the producer gas which is conveyed in a cool state to the setting to be re-heated in the recuperators. This system eliminates the large radiation heat losses which would otherwise occur if the gas was conveyed in a heated state. The waste flue gases at the chimney base have a temperature of only 430° C., thus not justifying the inclusion of waste-heat boilers proper.

These boilers are also constructed of riveted steel plate, and are of the familiar multi-tube heat interchanger type. The top portion of the boiler above the tubes is lined to a depth of 5 in. with firebrick, and the internal diameter at a section across the tubes is 3 ft. 9 in. The maximum safe steam pressure generated by these boilers is 130 lbs. per sq. in.

More steam is raised than is required for the running of the whole plant, including the steaming of the charges, the surplus steam being passed into the works mains.



SECTION THROUGH PRODUCER GAS PLANT.

Mention may be made here that on the new installation of chamber ovens which are now under construction and nearing completion at Wandsworth, this surplus steam if not required in the works mains, will be utilized to preheat the blast, and thus produce a gas of higher calorific value by increasing the hydrogen and carbon monoxide content. The steam raised per diem is about 88,200 lbs., and the feed water is automatically controlled, audible warning being given by a whistle should the water level become too high or too low, or the steam pressure excessive

The gas, after passing through the boilers, enters the static

washer-coolers, and passes in an upward direction against a stream of cooling water, falling over a series of truncated cones and discs, thus producing intimate contact between the gas and the water. This produces a reduction in temperature of the gas from about 180° C. to a temperature very little above that of the inlet water, but besides cooling the gas, this process removes a large percentage of the dust, fine particles of coke, and ferruginous matter out of the gas.

A section through the producer, boiler, and washer cooler is shown in the accompanying diagram.

Centrifugal Cleaning Fan.

The two streams of gas from the separate plants unite and enter the centrifugal cleaning fan, which is driven by a 15-B.H.P. steam turbine, running at 1575 r.p.m. A stream of water is injected into the fan which washes the remaining dust, &c., by centrifugal action to the outside of the fan where it is collected in a large seal pot. This fan maintains a constant pressure of 1 in. water gauge on each inlet producer gas supply. The clean cold producer gas is then conveyed by a 24-in. steel main to the settings and to the groups of 4 combustion chambers via individual control valves.

The producer gas is measured by a Kent balanced manometer recording meter, the orifice plate being situated in the 24-in. supply main. In the event of one producer unit being shut down, the requisite amount of heating gas is maintained by introducing town gas into the producer gas main to supply the deficiency. This method will be unnecessary when the new installation of chamber ovens is completed, as 3 out of the 4 producers will then be sufficient to maintain the producer gas supply for both plants.

Town gas is also used in this manner when starting up the settings from cold, raising the temperature to that required to maintain combustion of the producer gas.

Advantages of this Type of Plant.

(1) *Clean Producer Gas.*—One of the great advantages obtained with this plant is the production of clean producer gas. It can be definitely stated that the cleaning process is most efficient, as after 2½ years' continuous operation, there is no sign of any deposit of flue dust in the settings, neither has the silica work suffered any damage due to the action of ferruginous or alkali matter in the producer gas. This represents a great increase in the life of the silica work compared with the silica work of settings where the producer gas is not treated in this manner.

(2) *Constant Quality of the Producer Gas.*—The advantage of charging the producers regularly and frequently is shown in the production of gas of constant quality. During the period of test on this plant, the calorific value, taken at two-hourly intervals, varied only by 2 or 3 B.Th.U.—a variation of under 2 p.ct.

(3) *Producer Gas of High Calorific Value.*—The fact that the producers are fed with cold screened small coke, compared with a mixture of small coke and breeze, is more than compensated for by the resultant increase in the calorific value of the gas, together with the previously mentioned advantage—*i.e.*, the constant quality. The average figure obtained during the test on this plant was 133 B.Th.U. per c.ft., and at no time has the calorific value dropped below 128 B.Th.U. per c.ft. It has been found a decided advantage to work these units at their rated capacity rather than incur possible difficulty arising from a forced added throughput.

(4) *Labour Saving.*—The labour required on this plant is only one man per shift of 8 hours, or three men per day. Each man is responsible for the charging and running of the producers, the running of the boilers and washer-coolers, and the control of all the necessary machinery. It will be seen, therefore, that labour costs are reduced to the minimum.

(5) *Repairs and Maintenance.*—During the time that the producers have been running there has been very little repair work necessary. The only occasions for shut down have been for boiler inspection and minor attention such as steam leaks.

(6) *Easy and Accurate Control.*—The manufacture of producer gas in this manner does not rely upon estimation and guesswork, but is a scientific process.

Accurate observations are obtained of the fuel used, the water evaporated, and the producer gas made, while the rate of evolution of the producer gas, the rate of ash discharge, and quantity of steam supplied in the blast are easily regulated to meet the varying conditions in the coal carbonized and in the fuel supplied to the producers.

Working Results.

I give below some figures relating to the working of this plant.

Producer gas make	4,200,000 c.ft. per day
Calorific value, net	133 B.Th.U. per c.ft.
Fuel consumption	25·5 tons per day
Percentage fuel consumption	13·6 lbs. per 100 lbs. of coal
(5 p.ct. moisture, 12·5 p.ct. ash)	On dry ash-free basis
Steam raised per day	88,200 lbs.
Steam raised per lb. of fuel supplied	1·55 lbs.

Note.—It must be mentioned that this fuel consumption is for 14-hour carbonization periods with 2½ hours steaming.

Producer Gas Analysis.

	P.Ct.
CO	27·6
H_2	11·4
CH_4	0·6
CO_2	7·0
N_2	53·4

In conclusion, I wish to thank Mr. C. M. Croft, M.I.Mech.E., F.C.S., the Chief Engineer and General Manager of the Wandsworth Company, for allowing me to read this paper, and also for allowing me to include in this paper some of the data from the comprehensive report on the chamber oven plant, compiled by him and published recently in the Technical Press. [See "Gas Journal" for July 31, 1929, p. 251.]

Also, I would like to thank all those members of the engineering staff who assisted in the preparation of this paper and in the production of the diagrams and lantern slides.

Discussion.

The President, in opening the discussion, said that Mr. Chambers had dealt with the most interesting part of the plant. The generation of producer gas in outside producers had always appealed to him. It would be noticed that the producers were fed with screened coke of 1½ in. diameter; screened coke was free from breeze, and this accounted for the high calorific value of the gas obtained from the plant. Mr. Chambers had stated that occasionally it was necessary to introduce a little live steam when the fuel was coke from a high ash content coal, such as Yorkshire coal. Mr. Prater said he would like the author to confirm that this was actually Yorkshire coal. He went on to refer to the rodding hole on one side of the producer, and that only one man was required to work the plant per shift. Mr. Prater asked if manual clinkering was carried out during the shift, and if so to what extent? The first advantage of this type of plant was the clean producer gas obtained, and this was particularly important when working a plant involving downward travel of the combustion gases. Not only was the dust carried down the flues, but with downward travel there was a tendency for the dust to be forced on to the projecting brick surfaces, and it was at those points where the bricks projected that holing of the retorts occurred, which was the most disastrous thing that could happen; and that occurred in most cases from the outside of the retort, though it appeared at first to be on the inside. Clean producer gas went a long way to prevent this. It seemed that the plant at Wandsworth was sufficiently large to merit outside producers. The calorific value of 130 B.Th.U., said Mr. Prater, was due to the screened coke utilized, and it would be interesting to know if any experiments had been made with this particular plant using coke of over 1½ in. It appeared that practically all the fuel under 1½ in. was gasified in the producers, and this was rather a serious position because this particular size was that for which they had the largest sale.

Mr. J. M. Webber (Croydon) remarked that he also had been interested in the size of the coke used on the Wandsworth plant. If the size was up to 1½ in., how much breeze had been screened out of that coke? Mr. Webber also referred to the transportation of fuel in connection with this plant. All the fuel, he suggested, had to be brought to the plant, elevated to the screening apparatus, dropped down through the screen, and then elevated again to the feeding hopper. In conclusion, he inquired how the cost of the outside producer compared with that of the inside variety.

Mr. J. H. Goldsmith (South Suburban) asked for particulars of the breeze and large coke used on the plant, because, he thought, they must be hard put to it to supply domestic coke when they were utilizing it for works purposes. He asked if they had tried the use of large screened coke and breeze, because that was what they wanted for producers, in his opinion, and not the saleable domestic article. Mention had been made of the contemplated preheating of the blast by means of the surplus steam not required in the works mains. Were there any tests available, asked Mr. Goldsmith in conclusion, showing what increase might be expected in the temperature of the blast?

Mr. W. J. R. Waterford (Gas Light and Coke Company), referring to the air supply and Mr. Chambers' statement that it was occasionally necessary to admit a little live steam, asked what was the effect of using an auxiliary air blast, and if the same efficiency was still maintained.

Mr. W. T. Kenshole (Lea Bridge), referring to the percentage fuel consumption of 13·6 lbs. per 100 lbs. of coal given by Mr. Chambers in the working results, asked what was the average calorific value of the coal gas turned out, because it seemed to him that while it was a very good plant, and one they would all like to possess, it was a question of cost and whether it was warranted. It had been pointed out that there was no dust in the setting, and they all knew what the dust problem was in vertical retorts. They did not know, however, how much better off they would be if they could prevent dust getting there; the idea was good, but he questioned whether it was justified. Referring to the sensible heat boiler, he wondered if an efficiently lagged main would be sufficient to get over the trouble due to heat losses.

The Author's Reply.

Mr. Chambers, replying to the points raised in the discussion, remarked that a number of members seemed to query the point concerning the use of screened coke. That largely depended upon the clinkering problem; for when they started supplying a heavy load they got into difficulties. The producers were working full-out, and if one was shut down they had to make up the deficiency with coal gas. Mr. Chambers said he had no percentage figures relating to the amount of breeze in the coke. If breeze got into the coke they

immediately experienced trouble in regard to clinkering, a large amount of clinker forming, resulting in inefficient working of the plant. It was best, therefore, to maintain a standard size of coke of 1½ in., which accounted for the apparent discrepancy in the paper.

Referring to the transportation of the coke, Mr. Chambers said that the coke went through a gravity screen, and fell down by way of a deflector, and was carried along a gantry and dropped into the hoppers. The amount of breeze depended upon the amount going over the screen and the quantity of moisture in the coke. Although they tried to maintain 1½ in. diameter coke and up to that size, there was a certain amount of breeze, and with this small amount there was no trouble, but immediately they started to mix breeze and coke they got into difficulties with clinkering. They found that when using Yorkshire coal they had clinkering trouble again; to keep the amount of clinker down they introduced more steam. The clinker from Yorkshire coal was more liable to flux than that from Durham coal.

There were ball rodding holes provided in the top of the producer, and these were rodded every shift in order to keep the fire broken up; one man could push the bar through easily. By this means they could measure the depth of ash in the producer. The rod was pushed down to the base of the producer and then withdrawn; a strip of paper was then rubbed along the rod, and the point where it caught fire indicated the depth of ash in the apparatus. As soon as live coke was reached the paper caught fire. The bottom of the producer was water cooled.

They had not tried the use of large coke because the contractors had stated that the plant was not designed for large coke. Preheating the blast had been contemplated on the new plant, but they did not know what the effect would be. Naturally the quantity of steam admitted with the blast was limited. Although excess steam would increase the water gas reaction in the producer and make gas of a better value, it would have the effect of cooling the fuel bed. So there was a balance beyond which they could not go, and they had not yet found this balance. In reply to Mr. Kenshole's question, he stated that the actual figure was 485 B.Th.U., which was considerably above the rated figure of 470 B.Th.U.

Mr. GOLDSMITH proposed, and Mr. H. C. SIMS (South Metropolitan Gas Company) seconded, a hearty vote of thanks to the readers of the papers, to which the authors respectively replied.

[We regret that in the discussion on Mr. Andrew's paper on "Refrigeration," published in last week's issue, the remarks of Mr. C. A. Masterman (Gas Light and Coke Company) were attributed to Mr. C. C. Clack (Tottenham.)]

Midland Junior Gas Association

Mr. W. Macnaughton presided at a meeting of the Midland Junior Gas Association on Thursday, Dec. 11, at the Council House, Birmingham.

AN AUTOMATIC SEAL ARRANGEMENT FOR C.W.G. PLANTS.

J. H. WAINWRIGHT, M.Inst.Gas E., of Halesowen.

In the total production of town gas, the proportion of carburetted water gas is considerable, and in many works the C.W.G. plant plays a most important part in providing for the "peak load." Yet surprisingly few developments in plant have occurred until the last few years, and little has been described adequately in the Gas Associations' Transactions. For this reason the author proposes to take up the time available in the description of a type of plant and the method of working it, with special reference to an automatic seal arrangement which has been recently introduced to provide a better and more simple system of control.

HISTORICAL.

The back-run method of introducing steam into the superheater was incorporated in the first commercial effort to enrich water gas by means of oil in 1875 by Lowe. The process was not continued at that time, and only recently have the advantages of the "back-run" been fully developed. Lowe sprayed the oil on to the top of the fuel bed, but as early as 1890 the double vessel plant was introduced, the oil being then admitted into the carburettor. This is the present-day practice.

The plant consists of the following: Water gas generator, combined carburettor and superheater, automatic seal box, blower driven by steam engine, oil pump and meter, steam hoist and coke charging wagon, and working stage.

AUTOMATIC SEAL BOX.

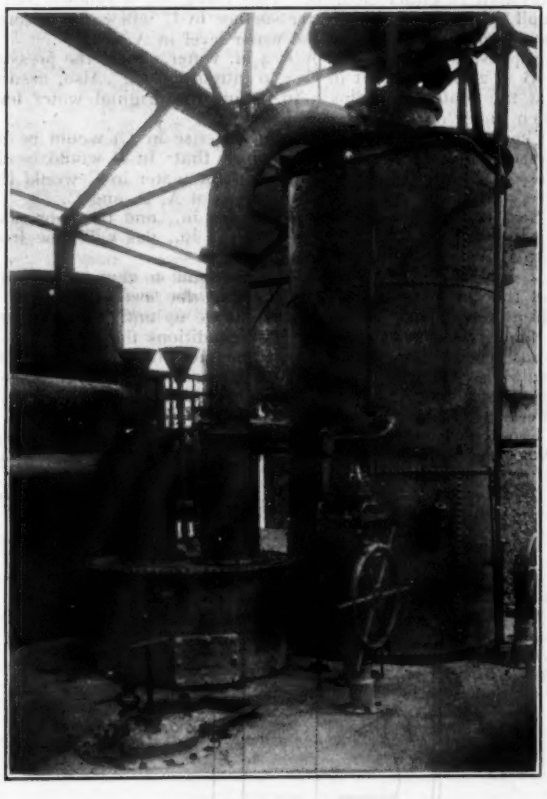
This consists of a cylindrical vessel divided into two compartments, each fitted with a dip pipe, one connected to the bottom of the generator for the "back-run" gases, and the other connected to the top of the superheater for the "up" run or "forward" run gases. The dip pipes are sealed in water giving a seal of 2 in. above gasholder pressure. Around each of these dip pipes is another one forming an annular space which is connected to the condenser and the gasholder. These larger dip pipes are carried below the bottom of the dip pipes to prevent any possibility of gas escaping into the box proper. Each compartment of the seal box is provided with an overflow, sludge pipe, and cock, sealed in a cast-iron pot.

The seal-box serves a dual purpose, in preventing the gas from flowing back from the holder when shut down or during the "blow" period, and also for changing the direction of the flow when on the make, without the aid of hot gas valves.

The usual type of seal box used on those plants which are dependent on hot gas valves for reversing the gas run consists of a large vessel containing water, into which the gas delivery pipe is allowed to dip. The outlet pipe to the holder is connected to the top of the vessel, and is not sealed.

It will be seen that the holder pressure is exerted on the surface of the water; and, the area being large, the depression is small and the rise in the inlet pipe is an amount corresponding to the pressure of the holder. When the pressure in the dip pipe is greater than the pressure of the holder, the level of water in the dip pipe is forced down, tending to make the relative levels of water equal to the difference in pressure in the dip pipe and the holder. The area of the dip pipe being small compared with the area of the seal box, the water in the dip pipe is forced down below the bottom of the dip pipe, allowing the gas to escape into the seal box and away to the holder. If it is necessary to seal a larger pressure against a smaller one, the larger of the two pressures must be exerted on the larger surface of water. On this principle, the design of the automatic seal box is based; and by its means the change over from "up" to "back" run is made without the use of hot gas valves.

Instead of connecting together the pipes from the generator bottom and the superheater top, and using two hot gas valves (one valve to shut off the wash box from the bottom of the generator when on the "up" run, and the other to shut off the gas from the superheater top when on the "down" run,



Seal Box at Halesowen.

and one pipe common to both sealing in the wash box, as is the usual method), both the "back" run pipe from the generator bottom and the "forward" run pipe from the superheater top are taken direct to the automatic seal box and sealed, one in each compartment. An equilibrium pipe is fixed between the dip pipes and their respective seal boxes, each equilibrium being fitted with a three-way plug cock, the plugs of which are connected together by means of link motion to the three-way steam cock, all operated by a short lever. Each compartment of the seal box is fitted with a cleaning-out hole and cover. There is also an adjustable overflow to each compartment, to-

gether with a drain pipe and cock, all carried below the stage to a seal pot which overflows into a tar separator built outside the building.

Theory of the Automatic Seal Box.

The device is intended for use in connection with gas where a "flow" or "no flow" state is desired; in other words, where the full volume of gas, or none at all, is allowed to pass. In principle it is somewhat similar to the ordinary seal box, though, whereas the ordinary seal box has only two compartments and gas can only flow in one direction, the automatic seal box has three compartments, and gas can be allowed to pass in two directions, or stopped completely, and is controlled by one lever operating three-way cocks and suitably arranged small connections between the various compartments.

The compartments are:

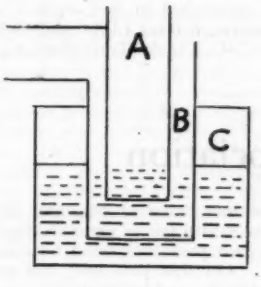


Fig. 1.

A, that formed by the inner pipe;
B, small annular space between this pipe and an outer pipe; and
C, large annular space outside B.

The cross-sectional areas of A and B are equal or thereabouts; while the area of C is more than twelve times greater than that of either A or B. This being so, it follows that a small depression of the water surface in C will cause a correspondingly greater rise of the water level in A or B.

Suppose the pressure in A = 4 in. water gauge, the pressure in B = 2 in., and that in C = 0 (atmospheric). Also, assume that the centre pipe dips 3 in. below the original water level when under no pressure.

Then the water in A (allowing for rise in C) would be depressed slightly less than 4 in., that in B would be depressed slightly less than 2 in., and the water in C would rise a very small amount, due to the areas of A, B, and C.

Now the centre pipe only dipping 3 in., and the depression of the water level in A being nearly 4 in., gas will flow from A to B, because the seal is broken.

If now the pressure in C is made equal to that in A (4 in.) and that in B remains at 2 in., then the levels in A and C will go down, and the level in B will go up until the difference in the levels is 2 in. Under these conditions the compartment A has become part of a large compartment (A *plus* C) with the result that the water in A is only depressed very slightly, and the greater movement takes place upwards in B until a level difference of 2 in. is reached.

The depression in A being very small and the dip of the pipe being as originally assumed (3 in.), no gas will flow, because the seal remains unbroken.

In other words, if C is open to atmosphere, gas will flow from A to B; but if A is connected to C, no gas will flow

Argument and Calculations Justifying the Theory.

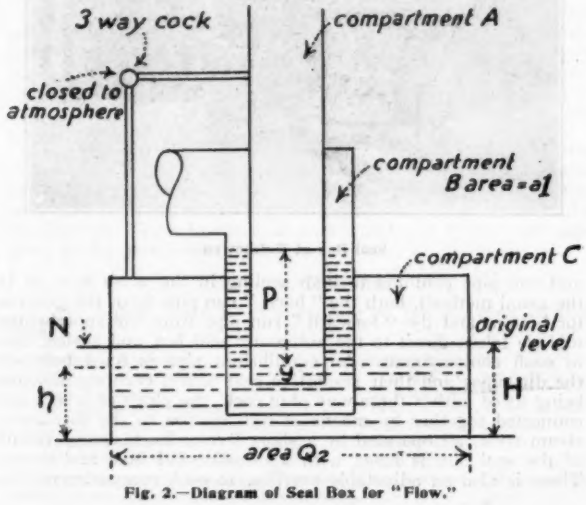


Fig. 2.—Diagram of Seal Box for "Flow."

A and C are connected through three-way cock, therefore pressures are equal.

Whatever pressures exist the volume of water remains constant, and equals H by a_2.

Volume under pressure difference $P = Pa_1 + ha_2$.

Therefore $Ha_2 = Pa_1 + ha_2$.

and $a_2(H - h) = Pa_1$

$$H - h = \frac{Pa_1}{a_2}$$

$H - h$ depression of water level in A and C.

Call this x; then $x = \frac{Pa_1}{a_2}$ for all sizes of box.

The amount of seal y required under these conditions may be chosen arbitrarily, but, the greater y is, the greater will be the pressure required to force the seal when gas is intended to pass—*i.e.*, when C is open to atmosphere. This pressure would have to be in excess of $x + y$.

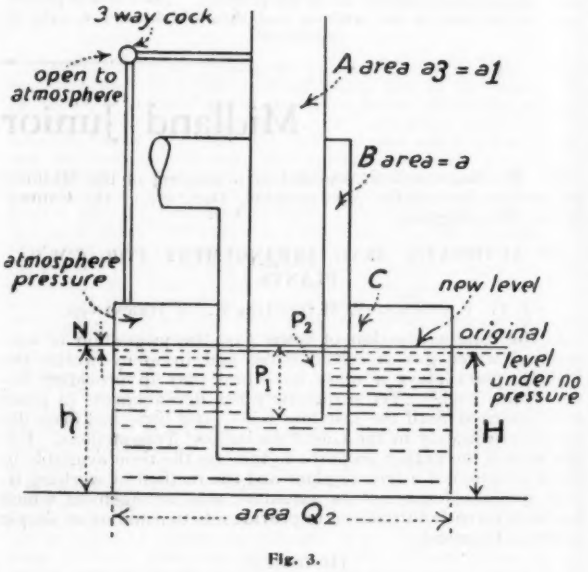


Fig. 3.

The pressure in C being zero or atmospheric, and P_1 and P_2 being measured therefrom, they will represent the actual pressures thrown by the holder and the gas coming from the plant.

P_1 = Pressure in A.
P_2 = ,, ,, B.
h = Water level in C due to above pressures.
H = original level in C.
Z = rise of level in C.

For equal volumes—

$ha_2 - P_1a_2 - P_2a_1 = Ha_2$

$a_2(h - H) = P_1a_2 + P_2a_1$ but $a_2 = a_1$ and $h - H = Z$.

then $Za_2 = a_1(P_1 + P_2)$

$$Z = \frac{a_1}{a_2}(P_1 + P_2) \text{ or } \frac{a_2}{a_2}(P_1 + P_2).$$

Depression of level in A $= P_1 - Z = P_1 - \frac{a_1}{a_2}(P_1 + P_2)$

,, ,, ,, ,, B $= P_2 - Z = P_2 - \frac{a_1}{a_2}(P_1 + P_2)$

If dip of centre pipe below original water level is less than $P_1 - Z$, gas will flow from A to B—*i.e.*, if $x + y$ is less than $P_1 - Z$.

Example—

Let pressure in A = 6 in. = P_1,
,, ,, ,, B = 3 in. = P_2,
,, ,, ,, C = 0 = atmospheric,

then depression in A $= P_1 - \frac{a_1}{a_2}(P_1 + P_2)$.

If A is 12 in. diameter $a_1 = 113$ | $\frac{a_1}{a_2} = 0{\cdot}0625$,
,, C ,, 48 in. ,, $a_2 = 1810$ |

and depression in A $= 6 - 0{\cdot}0625$ in. $(6 + 3)$
$= 6 - 0{\cdot}5625$ in.
$= 5{\cdot}4375$ in.

If the amount which the centre dips below the original level is made $4\frac{1}{2}$ in., then gas will flow.

Now connect A to C, then
Pressure in A = 6 in.
,, ,, B = 3 in.
,, ,, C = 6 in.

and depression of level in A $= x = \frac{Pa_1}{a_2}$, where P is difference between pressure in A or C and B.

$x = (6 - 3)\ 0{\cdot}0625 = 0{\cdot}1875$ in., this being less than the dip of centre pipe ($4\frac{1}{2}$ in.), no gas can flow.

Where it is desired for gas to flow first in one direction through the plant and then in the opposite direction, as in the

"back" run process, two boxes are required. Connection is made from the bottom gas outlet on the generator to the centre pipe of the one seal box, and from the top of the superheater to the centre pipe on the second seal box. The outlets from the boxes are connected together into a common outlet main.

By means of three-way cocks and small pressure connections suitably linked, it is arranged that when the outer compartment *c* of one box is open to atmosphere, the outer compartment of the other is connected to its own centre pipe A. The flow of steam to the plant is also changed by the three-way cock from the bottom of the generator during the "forward" run to the top of the superheater during the "back" run. The cocks are linked together and controlled by one lever which ensures that when steam is admitted to the generator bottom for the "up" run, the bottom gas outlet is connected to the outer compartment of the seal box, thus creating an effective seal. The same applies when steam is admitted to the top of the superheater.

Working of the Plant.

The process of carburetted water gas manufacture as applied to the plant described is known as the "back" run process, and its chief feature is the simplicity of control as obtained by the use of the automatic seal box. The difference between the "back" run process, and the ordinary method of water gas manufacture is as follows:

The "down" run steam, instead of being admitted direct to the top of the generator (as practised in the ordinary method of working), is admitted to the top of the superheater and passes down the superheater and through the carburettor before entering the top of the generator. On leaving the bottom of the generator the gas is passed to the automatic seal box by a separate, or "back" run connection. The "up" run is made in the regular way—that is, the steam is admitted to the bottom of the generator and passes out as blue water gas to the carburettor for oil enrichment, and through the superheater to the automatic seal box.

This seal box is automatically controlled by the pressure thrown by the plant, by means of equilibrium pipes connecting each dip pipe to its respective compartment in the seal box, as previously explained. When the three-way steam cock is set for the steam to flow to the bottom of the generator—*i.e.*, "up" run—the equilibrium three-way cock on the connection between the "back" run dip and the outer compartment of the seal box is set to allow the pressure in the "back" run pipe to be conveyed to the outer compartment of the seal box, and the three-way cock on the connection between the "up" run dip pipe and the "up" run compartment of the seal box is set closing the connection between the dip pipe and the seal box, but placing the outer compartment of the seal box open to atmosphere. It will be seen from this that, when steam is admitted to the bottom of the generator for the "up" run, the pressure at the generator bottom reacts along the "back" run pipe to the dip pipe at the seal box, and also along the equilibrium pipe to the outer compartment of the seal box. This pressure being greater than the holder pressure, the water in the seal box (the overflow of which is fixed to give a seal of 2 in. above holder pressure) is forced up the annular space round the dip pipe, thereby effectively sealing the "back" run dip pipe. In the "up" run compartment the connection between the dip pipe and outer compartment of the seal box is closed, and the outer compartment open to atmosphere by means of the three-way cock. There is no pressure in the outer compartment, and the "up" run gas from the top of the superheater is allowed to break the normal seal of the dip pipe and proceed up the annular space to the condenser.

When the "back" run is in operation, the lever on the three-way steam cock is reversed and the three-way equilibrium cocks are also reversed. The steam enters the top of the superheater and the pressure reacts along the dip pipe of the "up" run compartment of the seal box and is sealed off exactly as described for the "back" run compartment.

Advantages of the "Back" Run Process, Combined with the Automatic Seal Box.

The action of the automatic seal box is absolutely positive and entirely eliminates the possibility of "blow" gases leaking to the holder during the "blow" period.

The top and bottom hot gas valves, employed in the old-method of working, are eliminated. These valves are always a source of trouble due to the high and variable temperature of the gases passing through them, causing undue contraction and expansion likely to result in the valve cracking. Also, there is considerable effort required to operate these valves when changing over, compared with the operation of the automatic seal box, which only requires the movement of a small lever through 90° to change over from the "forward" run to the "back" run. As a consequence, there is no interruption of the make of gas when changing over, this being so simple as to make it admirably suited to plants which are automatically operated.

The automatic seal box fulfils the duties of a wash or ordinary type of seal box.

By adopting the "back" run process there is an increase in the make of gas per ton of coke of 12½ to 15 p.ct., as on the "back" run the steam is highly superheated in passing through the superheater and carburettor before entering the generator, enabling water gas to be made without the necessity of a preliminary blow.

The chequer bricks in the carburetting vessels are freed from carbon deposit from the oil, which is carried forward with the steam to the generator. Consequently the chequer bricks are kept in a more efficient state for the absorption of heat for utilizing in carburetting the oil on the "up" run.

There is also a saving in heat losses—that is, during the "up" run a certain amount of heat in the carburetting vessels is carried forward with the water gas on the "back" run. This heat is transformed to the generator, again making for a saving in coke. A greater control of the heat in the carburettor and superheater is also obtained, and consequently longer life to the chequer bricks.

Discussion.

The President suggested that in many gas-works carburetted water gas plants served the purpose of holders. With ever-increasing gas consumption, there was a surplus of coke on the market, and to get rid of it it was necessary to make water gas. The coke ovens were serious competitors of the gas-works, and it appeared to him that, with the large number of coke oven plants, more water gas would be used with coal gas in the future. Mr. Wainwright had made out a good case for doing away with hot gas valves. Having regard to the increase in the amount of gas made by the system described, he would like to know if there was any extra cost in plant maintenance, whether "linings" depreciated more quickly, and whether any trouble arose through leakage on the sides of door frames. He wondered, too, if there was any economy in the use of waste-heat boilers with the back-run process.

Mr. A. R. Myhill (Birmingham), in moving a vote of thanks to the author, congratulated Mr. Wainwright upon the originality of his subject and the ingenious method described for controlling the seal of the water gas plant. He maintained that water seals should be used more generally; but it never occurred to him that, in the back-run process, the application would be so simple. Having regard to the awkwardness of operating anything in the way of control of hot gases by means of valves, which themselves became hot, he thought such a method as that described had a great future. The spraying of oil into the sides of the vessel represented a departure from the usual practice; and he would like to know if any tests had been carried out, or experiments made, in connection with carburants other than gas oil. He thought the seal would lend itself admirably to automatic control.

Mr. F. A. Jenkins (Leamington) seconded the resolution.

Mr. R. L. Greaves (Wolverhampton) inquired if there was any gas leakage from the automatic seal box, with the venting to the atmosphere. He had had experience of two back-run sets on different works; the main feature appeared to be that there was a very definite increase in the capacity of the set when it was converted into a back-run. At Shrewsbury the increased make was considerable; and at Wolverhampton there was an increase, though less pronounced than at Shrewsbury.

Mr. A. W. Elliott (Shrewsbury) said his experience in the use of hot gas valves was that they required a little trimming up on the lathe, so that serious leakage did not occur. He would like to know how the gas make over 24 hours compared with the nominal capacity of the plant.

Mr. S. K. Hawthorn (Birmingham) thought a further advantage could be claimed for the system in the condensation of the gas after leaving the wash-box. Another question was as to the wear and tear on the bricks due to the introduction of steam to the top of the superheater.

Mr. Wainwright thanked Mr. Myhill and Mr. Jenkins for the cordial vote of thanks. Replying to the discussion, he stated that a small flow of water was maintained at the two funnels in the seal-box; by means of that water the level was maintained on the two sides of the box. Since the introduction of the seal-box the maintenance charges were no higher than with the hot gas valves; in fact, they were rather lower. He did not think it would be necessary to replace the seal-box during the lifetime of the plant. Attention was drawn to the remarks of the President of the Institution of Gas Engineers at the Autumn Meeting during the discussion on the C.W.G. paper. "If the back-run valve were constructed of some other material, a great saving in maintenance costs would accrue." Mr. Wainwright submitted that for this purpose the water seal was ideal. As to the question of leakage at the doors, he pointed out that the latter were sealed by means of asbestos rope, which, of course, was renewable. At Halesowen it had been renewed only once in 2½ years. Regarding spraying into the carburettor, in each of the sprays there were three holes which were drilled towards the centre; the effect was that the pressure, which was maintained at about 40 lbs., acted on the outer diameter, causing the spray when the oil entered. The oil was thus spread over a large area. It had been suggested that there was no saving in installing waste-heat boilers if the back-run process were adopted, but that assumption was wrong, though it might be necessary to augment the steam supply required for the C.W.G. plant by outside boilers. He had only used gas oil, not creosote. As to the three-way cocks, the connections were only ¾ in.—which was adequate. Personally he had not experienced any trouble whatever in the use of the three-way cocks. It was a matter for regret that the carburetted water gas in town gas could not be maintained at a steady

percentage. At Halesowen they were not able to keep the percentage constant. The illumination with the same size of mantle appeared to be brighter, though the C.V. remained constant when there was a proportion of carburetted water gas in town gas. As to any question of gas leakage, he pointed out that this was not possible, as the plates were carried down. It was pleasant to hear that the back-run process had increased the capacity of the plant at Shrewsbury. He was not able to give any information regarding condensation. On the question of purging, Mr. Wainwright pointed out that no blow gas came forward under the arrangement in which it was worked at Halesowen. He did not think the steam of the superheater did much damage to the life of the chequer bricks. Wear and tear was about normal.

Tar Removal by Electrostatic Precipitation.

The complete removal of tar from coal gas is a problem that has occupied the attention of gas engineers since the early days of gas production. The importance of tar removal has long been recognized, but the difficulty has been to effect economically a complete removal with the types of plant available.

An excellent brochure recently published by Messrs. Simon-Carves, Ltd., of 20, Mount Street, Manchester, describing the firm's electrostatic tar precipitator, should be of interest and practical value to those who have the important subject of tar removal under consideration.

With the aid of photographs and diagrams, the brochure sets out to explain the principle of electrostatic precipitation and the advantages of the system, applying as it does the Westinghouse metal oxide rectifier to high voltages, and obtaining results which are claimed to be far in advance of anything that has been reached previously. The efficiency of tar removal by this process is stated to be regularly over 99 p.ct., and the tar content reduced to less than ¾ grain per 100 c.ft.

The principle of electrostatic precipitation consists of passing the tarry gas through an intense electric field set up between a central electrode at a high voltage and the walls of earthed tubes or plates. The tarry particles, which are present in the gas in its passage through the tubes or between the plates, are charged, move across the field, and deposit on the earthed surfaces on which the tar coalesces, leaving the gas quite clear. The high-tension direct current necessary for charging the central electrode is obtained from a suitable high-voltage rectifier supplied from a step-up transformer, and is controlled from a cubicle containing the required switchgear and voltage regulators.

The brochure goes on to describe and illustrate the various types of rectifiers in use for precipitation purposes—viz., the thermionic value; the mechanical or commutator type; and the copper oxide type. The publication further deals with the construction details of the Simon-Carves detarrer and some of the ancillary apparatus used in connection therewith, such as alarms, controls, and measurement devices, while finally a diagram in colour of the side and front elevations of the plant clearly indicates the working principles.

The removal of tar fog, states the brochure, ensures a freedom from tar troubles in the saturators, where direct recovery of ammonia is practised, cleaner scrubbing oil, a general cleanliness of gas mains throughout the plant, and less fouling of the oxide purifiers where gas is sold for domestic consumption.

Holmes Connersville Products.

Holmes-Connersville patent positive displacement gas meters were first introduced to the gas industry of England in 1926, when a station meter of 5 million c.ft. per day was installed at the Poole Works of the Bournemouth Gas and Water Company, while another of the same capacity was supplied to the South Suburban Company for measuring crude carburetted water gas.

The foregoing opens the foreword introducing the first part of a booklet recently published by Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, describing their "Connersville" meters. The matter in this publication is set out in an interesting and readable form, accompanied by a number of photographs and diagrams, and its purpose is to supplement the information contained in previous publications, giving, in greater detail, technical explanations of the design and construction of the meter, together with the methods of calibration and testing on which its claims as a measuring instrument are based.

A useful table of meter sizes and capacities is given at the outset, showing the floor space, height, weight, &c., of the various sizes of meters. The principle of operation is next described in detail, together with methods of testing. Some of the advantages claimed for this type of meter are then dealt with, among them that of self-cleaning. Because the gas enters at the top of the meter, it is stated, the impeller tip must always travel downward along the cylinder. Moreover, the tips of the impellers are machined to sharp cutting strips so that the meter is self-cleaning, and solid impurities pass downward through the meter and out through the outlet pipe. Further advantages claimed for this meter include no internal contact or wear; gears at both ends eliminate vibration; and casings are composed of properly reinforced castings.

A short section touches briefly on the subject of high-pressure meters, the principle of operation of which is exactly the same as the standard low-pressure meters, while made from heavier and stiffer castings in order to prevent any distortion which might effect the small running clearances. A number of excellent photographs of typical examples of "Connersville" meters and other plant installed in some of the largest gas-works in the country conclude the booklet.

Part 2 of this publication deals with Holmes-Connersville gas exhausters, boosters, air blowers, and pumps.

Smokeless Fuels *versus* Fogs.

Gas Industry Quarterly Review.

If 1930 has been a notable year of development in the industries concerned with gas production and distribution, it has provided, at the same time, striking, even startling, evidence of the need for an extended adoption of such fuels as gas and gas coke for domestic and industrial purposes. Nor is it necessary to go back for that evidence farther than the last week or so, when there has been such appalling waste and discomfort as the result of fogs.

The foregoing introduced the "Gas Industry Quarterly Review," which appeared in the "Manchester Guardian" for Dec. 17. The article goes on to discuss this paramount question of fog prevention by the more general adoption of smokeless fuels. It is interesting that, at a time when these recent extreme fog conditions have persisted for a much longer period than usual, a report like that just issued by the Medical Officer of Health for Salford should deal specially with the evil of atmospheric pollution. As far as Salford is concerned, stated the writer, the M.O.H. admits that "domestic smoke plays a much more important part than industrial smoke in bringing about atmospheric pollution." He submits definite proof at the same time that dry gas coke is an "ideal smokeless fuel" for the open domestic grate. "Vertical coke fires," he states, "give out a tremendous amount of radiant heat, are pleasant and bright to sit by, give rise to no objectionable fumes in the room, require little attention, and are exceedingly economical."

Few of those who make a study of the gas industry and are in touch with what is being done on smoke abatement problems will disagree with these remarks. But their knowledge, while it compels agreement, at the same time fosters a certain impatience. How long will the inevitable evils of an atmosphere polluted by smoke be endured? asks the writer of the article. As the gas industry and all associated with it are aware, gas and coke in themselves hold the key to the solution of the smoke abatement problem. It is a solution, moreover, that can claim to be more popular than any other; for with gas coke the attractive features of the coal fire are retained without the disadvantages of that most uneconomical of heating methods.

Ever Improving Efficiency of Gas Appliances.

The review further deals with the increasing popularity of gas for lighting, exemplified in very convincing manner by the statement made recently in connection with the Manchester Gas Department to the effect that in two months nearly half as many new customers have been made as had been made during the whole of the previous ten years. This is considered to be largely the result of the introduction by the gas industry of remote control switch arrangements for gas lighting.

Work is continually proceeding, it is stated, with the object of improving the efficiency of gas lighting, heating, and cooking apparatus, and mention is made of some of the results obtained from the examination of the products of combustion from typical appliances, as dealt with in the Twenty-Fifth Report of the Joint Research Committee of the Institution, presented at the recent meeting.

The review discusses the increasing use of gas for industrial purposes. In this connection Birmingham is quoted as an example of the growth that is taking place. From 389,511,000 c.ft. of gas for the year ended March, 1911, the output for industrial use in Birmingham has risen to 3,209,949,000 c.ft. for the year ended March, 1930, an increase of 2,820,438,000 c.ft. in 19 years. The 1930 figure is 211,154,000 c.ft. in excess of that for the year 1929. In conclusion, mention is made of the industry's continuous publicity activities, quoting Mr. C. S. Rhead's statement recently before the Auxiliary Section of the North of England Gas Managers' Association that "the value of publicity work lies as much in the retention of old business as in the attraction of new."

Nottingham Gas Conspiracy Charges

Defendants Committed for Trial on All Charges

Investigation of the cases arising out of alleged irregularities extending over many years in connection with the Gas Department of the Nottingham Corporation—see "JOURNAL" for Dec. 10—was resumed at the Guildhall, Nottingham, on Tuesday, Dec. 16, before Mr. J. G. Small and Mr. A. E. Smith, and was continued on subsequent days.

Charles Cassidy, who had been employed as a lorry driver by John Ernest Allen, was recalled to give further evidence. He spoke to 18 sinks being taken by him from Messrs. Woodhouse's premises in George Street to some property of Leonard Ball in Mitchell Street. When witness fetched the sinks he was not given a delivery note. He had seen one of the Sissons in Mitchell Street, when he was doing plumbing work on the property. He (Cassidy) took some plumbing materials from Mitchell Street to Allen's building yard, and from there they were transferred to Alfred Sisson's yard. Witness referred also to some fireplaces and overmantels which he fetched for Allen in Ball's name and conveyed to a shop in Bath Street, Ilkeston. When he arrived there he saw Leonard Ball, who told him that the goods were to be stored in a top room. Cassidy added that he had taken building materials to Radcliffe-on-Trent when Ball was building a house there, these goods being fetched from the sidings of H. & M. Lewis, timber merchants. He had also taken to Radcliffe 11 cwt. of nails obtained from the defendant Gardiner, and also white tiles which had been procured from Messrs. Woodhouse. The plumbing work upon Leonard Ball's new house at Radcliffe was being done by Alfred Sisson, the lead for the purpose being delivered in Woodhouse's lorry. The fireplaces originally conveyed by witness to Ilkeston were ultimately taken to the Radcliffe house, Leonard Ball being present when they were loaded up. Cassidy said he also brought some timber away from Radcliffe, which was taken to Allen's houses in Westdale Lane, Mapperley. Nearly two years ago witness, at Percy Sisson's request, fetched some lead piping and sheet lead from Woodhouse & Co., and took it to Percy Sisson's yard in Nottingham. During the carting he made some remark to Sisson, who said "Mum's the word." Just prior to Allen's arrest he took three sinks to the premises of the accused, these having been obtained from Messrs. Woodhouse. He did not receive a delivery ticket when he fetched the sinks. He had seen Allen at his home since the latter had been released on bail, and Allen then told him that he (witness) would never get another job in Nottingham, and that he ought to clear out. Allen knew then that witness had made a statement to the police; and regarding this the defendant said that it was all through his (Cassidy's) fault that he had been kept in custody. Witness retorted that his statement was the truth.

In cross-examination by Mr. A. M. LYONS, Counsel defending Leonard Ball, witness said that he had carted stuff to the houses of Mr. Wragg, in Woodborough Road, an employee in the Gas Department, Mr. John Wilkinson, sen., Mr. Wilkinson, jun., and Mr. Mason, the Gas Accountant. Witness surmised two years ago that something was wrong.

Mr. LYONS: Such was the extraordinary looseness of this that somebody had only to use the magic words, "Gas Department," and he got anything?

Witness: I don't think that is right.

That is what you found?—When I went I always had orders to go.

Written orders?—No; verbal orders.

Any requisition notes?—No.

Where you went, "Gas Department" got anything you wanted?—Yes.

In reply to Mr. R. A. YOUNG, who represented Allen, Cassidy said that the latter's lorry was occasionally hired to the Corporation. Witness had been hired out for the day, and upon those occasions he took his orders from the Department which hired the lorry. None of the deliveries to which he had specifically referred was made on days when he had been hired by the Corporation.

In answer to Mr. Young, witness admitted that, prior to his meeting with Allen after the latter's release on bail, Mrs. Allen had found in his house certain candlesticks belong to her husband: and Mr. Young observed that this explained the accused's remark, "You will never get another situation in Nottingham." Witness said there had been no intention to steal the candlesticks, which, having been left over from a consignment of furniture dealt with on Mrs. Allen's instructions, were taken temporarily to his house. Witness added that at the time he had taken building material to the houses of Mr. Wilkinson, sen., Mr. Wilkinson, jun., and Mr. Mason work was being done upon them by Allen.

George E. Green, formerly engaged as a vanman in Nottingham, spoke to having conveyed lead to Allen's bungalow and sand and bricks and other things to Leonard Ball's house at West Bridgford, Nottingham, for which he had no delivery tickets.

Horace Keightley, cashier to Messrs. Woodhouse & Co., was called to prove certain entries and figures given in the accounts submitted by the prosecution.

Ellen Keeling, who formerly carried on business with her sister as ladies' outfitters at Goldsmith Street, Nottingham, spoke to the purchase of the concern by Leonard Ball in 1922, he then stating that he was acquiring it for his wife and sister-in-law. After the purchase had been completed he asked if she had any objection to the business being continued under its former title of Keeling, and she told him she had no objection.

Ernest Broadhead, who had formerly worked for Sisson as a plumber's mate, said that materials which were used in repairing Leonard Ball's property at West Bridgford were practically all obtained from Messrs. Woodhouse.

Gertrude Harris, who had been for fifteen years in the service of Gardiner as a clerk, said she had made out invoices for goods of which there was no record in any of the shop's books. This had been done on the instruction of Gardiner.

Further questioned, Miss Harris said that she knew that wireless sets went to several of the officials of the Gas Department, to both of the Mr. Wilkinsons and to Mr. Mason and Mr. Frost. She was not quite sure about Mr. Wragg.

Mr. LYONS: I suggest that they were never paid for by the men who got the sets. What do you say to that?—They have been paid for.

Have they been paid for by the men who got the goods?—I don't think so.

The CHAIRMAN pointed out that Mr. John Wilkinson had given evidence as to how he paid for the car purchased from Gardiner. A certain sum in notes was required by the vendor of the car to hand over to the person supplying it, and the balance was paid for by cheque, which included the wireless set. He (the Chairman), therefore, wondered whether Mr. Lyons' question was not extraneous matter.

Mr. LYONS: It is not, Sir, because I challenge the whole of that.

Mr. *C. J. Pain,* Fellow of the Institute of Chartered Accountants, and Senior Partner in the firm of Messrs. Hubbert, Durose, & Pain, of Nottingham, who had been engaged by the Corporation to examine the books of the Gas Department, said that his investigation began with the accounts of Allen. In the first instance witness obtained all the invoices from Allen to the Corporation Gas Department, and then caused to be searched the whole of the goods-received sheets to ascertain whether goods shown on the invoices had been delivered. He discovered that all the invoices bore the initials of the Engineer and Manager or his Deputy, the initials of the order clerk, and those of the clerk who was responsible for examining goods-received sheets to see that they corresponded with the invoices. With regard to the invoices of Allen, he was unable in some cases to trace the delivery of goods. In such cases he noticed the peculiar fact that the invoices bore the initials of the Engineer and Manager or his Deputy and the initials of Leonard Ball, but they did not bear the signature or initials of the clerk responsible for checking the invoices with the goods-received sheet. In a word, they bore the initials of Leonard Ball twice, he having usurped the authority of the clerk who was responsible for checking the invoices with the goods received. From 1927 to September, 1930, the total expended upon properties of Leonard Ball and other persons, with the exception of the Radcliffe house, was £3915, of which £2871 was on Leonard Ball's properties and £403 on the property and shops run under the name of Madame Beryl, and also belonging to Ball. The total expenditure upon the Radcliffe house was £2850. An analysis of the accounts which had been made by witness showed that from 1921 until 1930 no less than 342,714 ft. of medium troughing had been charged to and paid for by the Corporation, of which he had been unable to trace delivery. In an interview, Leonard Ball had stated that about 1921 he approached the Directors of Messrs. Woodhouse and their Manager, now deceased, and asked for commission of 2½ p.ct. upon all Corporation purchases. They informed him that it would not be possible for them to make a cash payment, but they would agree that he should have the equivalent in goods.

Upon the resumption of the hearing on Wednesday, Dec. 17, Mr. *F. L. Rolfe,* Chief Clerk at the Westminster Bank, Nottingham, was called to prove a large number of cheques drawn by Gardiner upon his account and presented and paid.

Mr. *Pain* added that, when Mullis was shown invoices for £58 10s. and £34 7s. 6d. for goods supposed to have been supplied to the Corporation, he admitted that no goods had ever passed, and that he had merely retained for his own use a small commission. The money received by him, after the deduction of such commission, had been paid to Messrs. E. & A. Keeling on a fraudulent invoice which they had sent him for a like quantity of goods. Witness had examined the whole of the goods-received sheets of the Gas Department for 1929, and could not trace the receipt of goods invoiced from Brown & Co. for £751 10s. From Brown & Co.'s books he found that invoices from E. & A. Keeling had been received during the same period referring to the same goods to a total amount of £492 13s. 9d. He also found that Brown & Co. were shown to have purchased raw materials from L. W. Ball to the total value of £184 12s. 6d. Mr. Pain added that examination of the invoices submitted by Brown & Co., which was Mullis' business, to the Gas Department in 1929 showed that the Gas Department had paid £751 10s. for goods in respect of which he could find no trace of a record of their having been received. Of that sum £677 6s. 3d. had gone into Leonard Ball's account, E. & A. Keeling being the conduit pipe for the purpose, and £75 3s. had been retained by Mullis. Various cheques which had been drawn from 1924 to 1930 by Leonard Ball in favour of Mullis were produced by witness. In regard to these cheques, Leonard Ball had afforded witness the information that he went "fifty-fifty" with Mullis. When witness showed Scotton invoices which he suggested were bogus, the accused said he could not produce written orders from the Gas Department. The orders had been given verbally over the telephone by Leonard Ball. The books of Messrs. H. & M. Lewis, of which firm he was a director, Scotton admitted, contained no record of the orders. During witness's examination of the details of the invoices for goods supplied to the Gas Department as appearing in Messrs. Lewis' day book, in relation to red lead, Scotton informed him that the goods so described were fictitious, and that they had not been delivered, but that other goods of a different description and equal value had been delivered. Scotton said that Mr. Stanley Lewis had no knowledge whatever of the sub-

stituted goods or the record book of those transactions. As early as 1921 there were invoices for goods sent by Allen to the Gas Department of which Mr. Pain said he could trace no record. Down to the date of criminal proceedings being instituted the amount of these invoices was £10,847 17s. 10d. The amounts involved in each case between the periods mentioned were: Woodhouse & Co. (Walter Ball), 1921 to date of proceedings, £1335; H. R. Deeley, 1924 to date of proceedings, £5388 12s. 1d.; Mullis, 1921 to date of proceedings, £3905 16s. 8d.; Gardiner, 1920 to date of proceedings, £32,990 11s. 10d.; H. & M. Lewis (Scotton), 1921 to date of proceedings, £8014 10s. 2d. The total of the invoices in the six cases was £62,482 8s. 7d. Witness added that he was still pursuing investigations into the accounts of the Department.

The magisterial investigation was completed on Thursday, Dec. 18, having extended over nine days, and at the final sitting of the Court Mr. Pain continued his evidence. In prefacing his cross-examination, Mr. LYONS stated that he made and could make no admissions of any sort.

Mr. WARD asked the Magistrates to commit all the defendants for trial at the Assizes upon the whole of the charges which had been preferred against them.

Mr. LYONS said that any committal for trial should not be for larceny, but for false pretences.

The Magistrates then retired and were absent from the court for 3½ hours. Upon their return they committed all the defendants for trial at the next Nottingham Assizes (which will probably be held in February) upon the whole of the charges which had been preferred of conspiracy and larceny.

REGISTER OF PATENTS

Igniting Gas Burners from a Distance. No. 338,124.

BECKER, A. C., of Berlin-Schöneweide.

No. 24,402; Aug. 9, 1929. Convention date, June 10, 1929.

This invention relates to means for igniting gas burners from a distance. In connection with lighting systems for gas burners suggestions have been made to provide the main gas pipe leading to the burner with a row of holes extending in the longitudinal direction, this pipe being surrounded by an outer pipe having a longitudinal slot and carried by a rotatable plug, the arrangement being such that in one position of the outer pipe a flame will pass from hole to hole to the burner, while in another position the holes are closed.

An auxiliary ignition pipe, having an inner gas supply pipe with perforations, is provided with a lateral gas outlet extending substantially throughout its length, the gas passing out therefrom being capable of being ignited by a pilot flame. The perforations in the inner pipe preferably increase in size or number the greater their distance from the end of the pipe at which the gas enters. The outer pipe may be provided with annular seam-like notches. The perforations of the inner pipe are arranged at the bottom, while the outlet slot of the outer pipe is disposed laterally. The perforations may, however, also be displaced laterally from the deepest position. The outer pipe may be closed, and the inner pipe open, at the outer end.

Burners for Water Heaters, &c.—No. 338,128.

BECKER, A. C., of Berlin-Oberschöneweide.

No. 32,260; Aug. 8, 1929. Convention date, April 13, 1929.

When the pilot flame is extinguished a closure device controlling a separate gas passage may be opened and the gas passage may be so arranged, that the gas passing therefrom is ignited by the main burner or burners and in turn re-ignites the pilot flame. A further feature of the invention resides in the fact that the pilot flame actuates a valve which when opened affords a passage for the gas to the main burner or burners. The supply of gas to the pilot flame is adapted to be throttled preferably simultaneously with the closure of the separate gas passage.

Prepayment Gas Meters.—No. 338,231.

METROPOLITAN GAS METERS, LTD., and FORSTER, J. D., both of Nottingham.

No. 25,610; Aug. 22, 1929.

This invention is for improvements in coin-freed gas meters of the type in which a prepayment coin is arranged to extend into a slot formed in a tumbler disc and between adjacent teeth provided upon a measuring-out disc arranged co-axially with the tumbler disc so as to constitute a driving connection between the two discs. The tumbler disc is rotatable through the medium of a handle provided thereon, while the measuring-out disc is operatively connected with mechanism for opening and closing a valve which is arranged to control the supply of gas through the meter.

Hitherto, state the patentees, the measuring-out disc has been capable of being rotated only in the direction which is necessary to effect the opening of the gas valve, and rotation of the disc in an opposite direction, which would normally close the valve, is prevented by means such as a spring-controlled pawl which is arranged in engagement with ratchet teeth provided on the said disc.

This invention allows the gas supply valve to be closed by authorized persons, so that, for example, in the case of a coin-freed gas meter being used in connection with gas fires in hotels, the valve may be closed by the proprietor should he so wish in the event of the full amount of gas which is available by the setting of the measuring-out disc through the medium of an inserted coin not having been consumed. The measuring-out disc is adapted to be rotated in one direction solely through the medium of an inserted coin movable with the tumbler disc to effect an opening of the gas supply valve and in the opposite direction by a key to effect the closing of the valve.

Meters.—No. 338,722.

THORP, F., BUTTERWORTH, E., and PARKINSON & COWAN (GAS METERS), LTD., all of Kennington Road, S.E. 11.

No. 34,621; Nov. 13, 1929.

This invention relates to gas meters, and has for its principal object to provide in a simple and efficient manner for the prevention of unregistered gas passing through the meter due to any undue depression of the liquid level in or around the oscillatory or reciprocatory bells.

The invention comprises the provision of a flexible bellows-like part secured to and extending between the open end of the bell or chamber and a fixed part of the meter, the bellows being immersed in the liquid, which acts as a preservative. Any circulation of such liquid due to differences in gas pressure within and at the exterior of the bell or chamber is prevented. The bellows may be made of leather or other suitable material; and the liquid may be an oil.

Ignition Means for Gas Stoves.—No. 338,748.

GAUTRON, L. G., of Geneva, and PORRET, H., of La Chaux-de-Fonds.

No. 37,193; Dec. 4, 1929. Convention date, Dec. 5, 1928.

This invention relates to electrical igniting means for gas-stoves. Ignition of the gas is effected by a resistance wire placed in a jet of gas and brought to incandescence by an electric current of low tension which momentarily traverses the resistance wire when the gas cock is opened, the opening of the gas cock operating to close the electric circuit and bring the wire to incandescence. On opening the gas cock, a contact arm is moved over a contact segment by a driving arm to close the circuit, this driving arm, at a given moment, being displaced by a cam to release the contact arm, which is automatically returned to normal position to open the circuit. The invention comprises details of construction and arrangement.

Water Gas of Low Specific Gravity. No. 338,804.

HUMPHREYS & GLASGOW, LTD., of Westminster (Assignees of A. F. KUNBERGER, of Philadelphia).

No. 2915; Jan. 28, 1930. Convention date, March 2, 1929.

This invention is addressed to the provision of a process of manufacturing a gas of lower specific gravity than present carburetted water gas. For this purpose hydrogen is produced by passing steam in contact with heated metallic iron, superheating and carburetting to the required extent the hydrogen and excess steam, and then passing them through the upper part only of an ignited fuel bed, the whole of which fuel bed is used simultaneously in generating water gas by up-running with directly applied steam. The resultant mixed gas is taken off above the fuel bed to storage.

The process, state the patentees, permits the variation of both the calorific power and specific gravity of the gas within wide limits by controlling the production of oil vapour or gas and hydrogen respectively, so that a gas may be made available which is replaceable for coal gas without inefficient appliance operation or the necessity of appliance readjustment. The process may be put in operation, or discontinued, quickly and economically, making it available as a source of peak or other supplemental gas.

Gas Oven Burners.—No. 338,806.

CLUTTERBUCK, A. H., of Neasden, N.W. 10, and HUMPHREY, S. W., of Hopefield Avenue, N.W. 6.

No. 3183; Jan. 30, 1930.

This invention relates to a burner for use in bread, biscuit, or other ovens fired by gas. The invention contemplates an arrangement whereby each burner tube can be controlled along its length in sec-

tions (as, for instance, the middle and outside sections), the supply to each section of which can be reduced, or completely cut out. In practice this is effected by valves from the header of the burner tube, a separate valve being provided for each section. The system, state the patentees, offers great advantages over any system in practice. Thus it permits of relatively more heat being evolved at the ends of the burner tube, by reducing the amount evolved at the centre, and thereby ensuring an even temperature across the oven.

Gas Meters.—No. 338,833.

McRobbie, W., and Milne's Meters, Ltd., both of Edinburgh.

No. 7997; March 12, 1930.

This invention relates to an arrangement of valves, gas passages, and link motion for operating the valves. The object is to shorten as much as possible the length of the passages through which the gas has to flow, thus eliminating drop of gas pressure due to frictional loss. A further object is to reduce the cost of manufacturing the meter.

The invention consists in arranging the valves to be transversely movable over the vertical central partition provided in the median plane of the meter to separate the diaphragm chambers, so that the valves are situated over the transverse gas conduit which extends along the upper edge of the said partition. The valve ports of each valve are preferably symmetrically arranged about a centre line which lies in the median plane of the meter, so that the central ports open directly into the transverse conduit, and the two ports on either side of each central port communicate respectively with the spaces at the two sides of one diaphragm. By this arrangement one of the outer ports of each set of valve ports may open directly into the space surrounding the diaphragm, while the other outer port of each set of valve ports may communicate with the inner diaphragm chamber by a relatively short passage or duct which offers the minimum restriction to the flow of the gas.

The valves are arranged to reciprocate in a path at right angles to the median plane of the meter, and are operated from the diaphragms by link motion.

Applications for Patents.

[Extracted from the "Official Journal" for Nov. 26.]

Nos. 34,488—35,275.

Bingham, J. H.—"Valves of dry gas meters." No. 34,694.
Dempster, Ltd., R. & J.—"Lubricating system for axles of spirally-guided gasholders." No. 35,213.
Glover & Co., Ltd., G.—See Bingham, J. H. No. 34,694.
Maschinenfabrik Augsburg-Nurnberg Akt.-Ges.—"Telescope gasholders." No. 35,020.
Walker, L. J. L.—See Dempster, Ltd., R. & J. No. 35,213.
Woodall-Duckham (1920), Ltd.—"Means for controlling flow of liquid from container." No. 34,735.

[Extracted from the "Official Journal" for Dec. 3.]

Nos. 35,276—36,086.

Glover, W. T.—"Prepayment mechanism for gas meters." Nos. 35,829, 35,830.
Keith, G., and Keith & Blackman Co., Ltd., J.—"Gas lamps." No. 35,688.
Trent Process Corporation.—"Manufacture of producer gas." No. 35,373.
Trent Process Corporation.—"Carbonization." No. 35,374.
West's Gas Improvement Company, Ltd.—"Vertical retorts for carbonization of coal." No. 35,567.
West's Gas Improvement Company, Ltd.—"Dampers for control of hot gases." No. 35,568.

[Extracted from the "Official Journal" for Dec. 10.]

Nos. 36,087—36,887.

Acker, J. E.—"Gas heating, cooking, &c., apparatus." No. 36,772.
Glover & Co., Ltd., T.—"Coin-freed mechanism for gas meters." No. 36,593.
Habamfa Hallescue Backerei Maschinenfabrik Rausch & Filbry.—"Gas-heated steam baking ovens." No. 36,630.
Tas, H.—See Acker, J. E. No. 36,772.
Turner, E. (Turner & Co., E.).—"Gas burners." No. 36,821.

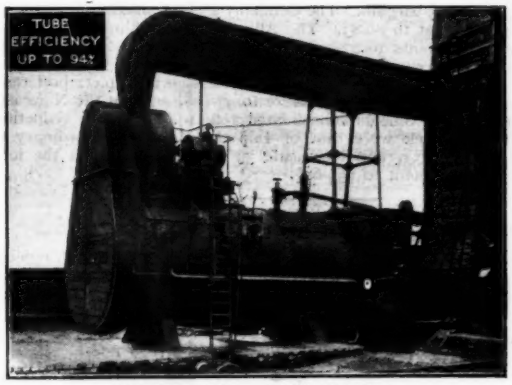
CASES FOR BINDING
QUARTERLY
VOLUMES OF THE "JOURNAL."
Price 3s. 6d. each post free.
Walter King, Ltd., "Gas Journal" Offices, 11, Bolt Court, Fleet Street, London, E.C.4.

NOW STANDARD—
SPENCER-BONECOURT
PATENT WASTE HEAT
BOILERS

NO. 1. 1 TON STEAM FROM WASTE HEAT FOR EVERY 1¼ TONS OF COAL CARBONISED
is being obtained from waste heat alone with Spencer-Bonecourt Patent Waste Heat Boilers.

NO. 2. 5¼ lbs STEAM PER LB OF COKE
put into the producers is being obtained from waste gases at 700°C. with these Boilers.

NO. 3. 4½ lbs STEAM PER LB OF COAL
put into the producers is being obtained from waste gases at 600°C. with these Boilers.



*Kirke Patent Nos. 140,851**, 186,801*, etc.*

NO. 4. 5 LARGE LANCASHIRE BOILERS FIRED WITH COKE & COKE BREEZE HAVE BEEN SHUT DOWN BY 2 SMALL SPENCER-BONECOURT PATENT WASTE HEAT BOILERS

NO. 5. No Economisers used in any of the above performances.

NO. 6. WATER GAS PLANTS have been fitted with these Boilers.

NO. 7. 14 REPEAT CONTRACTS have been received from *One Firm alone.*

NO. 8. HORIZONTAL, VERTICAL & INCLINED RETORTS. ALSO VERTICAL AND INCLINED CHAMBERS have been fitted with these boilers.

NO. 9. £12,000 PER ANNUM RETURN ON £6,000 ORDER is being obtained by one customer.

NO. 10. These Boilers have been installed in the Continents of
EUROPE, ASIA, AMERICA
AFRICA & AUSTRALIA

SPENCER-BONECOURT
LIMITED
THE WASTE HEAT RECOVERY SPECIALISTS
50-64, Broadway Buildings, Westminster, S.W.1
*Telegraphic Address: "Bonecourt, Sowest, London." *Phone: Victoria 2802-3.*

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

With the opening of the first Account of 1931 on the Stock Exchange last week there were no signs of any improvement in conditions. Sellers continued to predominate, and an all-round fall in prices set in, especially among Industrials. On Thursday, however, markets displayed a brighter appearance and prices rallied, though in the absence of buying orders this improvement was negatived by the end of the week.

Gas stocks and shares continued the even tenor of their ways, and prices, with the exception of two large increases and the usual half-yearly *ex* div. reductions of a number of debenture stocks, maintained the previous week's level. The two exceptions were the Portsmouth consolidated stock and the Alliance and Dublin 4 p.ct. debenture. Inquiries for the former caused a sharp rise of 8 points to 115-120; and having regard to the rate of dividend paid for the past two years (8 p.ct. against 7½ p.ct. for 1927) there is room for still further improvement, as the yield is high at £6 16s. 2d. for such a first-class security. This is another example of those cases in which a stock is closely held and rarely comes into the market and does not recover from *ex* div. reductions. The last recorded transaction was at 113 on Aug. 25—a good bargain. The Company's 5 p.ct. maximum stock improved by 1 point to 80-83. The Alliance and Dublin 4 p.ct. debenture gained 9 points to 72-77, and even this price is low compared with other irredeemable 4 p.ct. debentures quoted in the List. Increases of 1 point were recorded by Wandsworth 5 p.ct. preference to 95-98, Primitiva 4 p.ct. debenture to 97-100, and (on the Newcastle Exchange) South Shields consolidated 108-110. The only reductions in value last week were that of Imperial Continental ordinary by 5 points to 335-355, and Newcastle 3½ p.ct. debenture (at the local Exchange) by 1 point to 66½-67½.

New Capital Issues.

Rugby Gas Company.—The tenders for the £10,000 6 p.ct. redeemable preference stock, which were offered on behalf of the Directors of the Rugby Gas Company were opened on Dec. 17. They amounted to a total of £60,675, ranging from £105 10s. per £100 down to the minimum of par. The lowest successful price was £103 per £100, and the average price obtained was £104 6s. p.ct.

Overseas Opportunities.

[From the Board of Trade Journal.]

Chile.

Catalogues and Prices of Various Gas Appliances and Fittings, including Cooking Stoves, Gas Refrigerators, Industrial Burners, Domestic Switches, Lighting Fittings for Street and Interior Lighting.—H.M. Consul at Antofagasta reports an inquiry for the above. Firms in a position to offer such appliances of British manufacture can obtain the name of the inquirer upon application to the Department of Overseas Trade, 35, Old Queen Street, S.W. 1. (Ref. A.X. 10,633.)

Trade Notes.

A "B.T.H." Contract.

The British Thomson-Houston Company, Ltd., of Rugby, have been successful in obtaining an important order for two 75,000 KW. turbo-alternators from the County of London Electric Supply Company for their new Barking extension, the Consulting Engineers being Messrs. Merz & McLellan, of London and Newcastle. These machines are the largest yet ordered in this country.

"Ranarex" Densimeters.

The A.E.G. Electric Company, Ltd., of 131, Victoria Street, S.W. 1, have published a folder dealing with their latest type of "Ranarex" instrument. Fundamentally, the apparatus is a density meter for gases, continually measuring and recording the specific gravity of a gas or a gas mixture in relation to the atmosphere in which the apparatus is erected, or to another gas. In most cases the scale is graduated according to the requirements of the individual practical case, in per cent. of the content of the gas in question in the gaseous mixture.

The Maclaurin Process.

Maclaurin Coal Products, Ltd., 19, St. Vincent Place, Glasgow, C. 1, have published a brochure describing the Maclaurin process of coal carbonization. In this it is stated that sixteen years' work and research have been expended on perfecting the process. That the experimental stage is past is evident from the fact that it has not been necessary to alter the design of the 100 tons per day installation erected in the Dalmarnock Gas-Works of the Glasgow Corporation in any respect from that originally installed, and that the 20-ton per day installation in the Nuneaton Gas-Works has now run for over two years continuously without alteration and with very little expenditure on repairs.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 20.

The values of tar products are as follows:

Pitch, 45s. per ton f.o.b.

Creosote, for export, 5⅜d. to 6d. per gallon f.o.b.

Pure toluole, about 2s. per gallon; pure benzole, about 1s. 8d. per gallon; 95/160 solvent naphtha, about 1s. 5d. per gallon; pyridine bases, about 3s. 9d. per gallon.

All prices of spirits are *ex* sellers' works.

Tar Products in the Provinces.

Dec. 20.

The average prices of gas-works products during the week were: Gas-works tar, 19s. 3d. to 23s. 3d. Pitch—East Coast, 44s. to 45s. f.o.b. West Coast, Manchester, Liverpool, Clyde, 44s. to 45s. f.o.b.* Toluole, naked, North, 1s. 6¾d. to 1s. 7¼d. Coal-tar crude naphtha in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 3d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3¼d. to 3⅜d.; low gravity, 1½d.; Scotland, 3½d. to 3⅝d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 1s. 2d. to 1s. 2½d. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Dec.* 20.

Orders are falling away, and no improvement is expected until after the holidays. Meantime stocks are high and prices are easy.

Pitch.—Orders are scarce, and prices are nominal at 42s. 6d. to 45s. per ton f.o.b. Glasgow for export and 42s. 6d. per ton f.o.r. works for home trade.

Refined tar to Ministry of Transport Specification is being inquired for in considerable quantities for forward delivery. Quotations are steady at 2⅝d. to 3⅛d. per gallon f.o.r. works in buyers' packages.

Creosote.—Few orders are being placed. B.E.S.A. Specification is 2⅝d. to 3¼d. per gallon; low gravity, 3d. to 3⅛d. per gallon; and neutral oil, 3d. to 3¼d. per gallon—all f.o.r. in bulk.

Cresylic.—There is no material alteration in the position, which remains easy. Pale, 97/99 p.ct. is 1s. 6d. to 1s. 7d. per gallon; dark, 97/99 p.ct., 1s. 5d. to 1s. 6d. per gallon; and pale, 99/100 p.ct., 1s. 8d. to 1s. 9d. per gallon—all f.o.r. makers' works.

Crude naphtha.—While few orders are passing, value is steady at 4d. to 4½d. per gallon.

Solvent naphtha.—Values are unchanged at 1s. 2½d. to 1s. 3d. per gallon for 90/160, and 1s. to 1s. 0½d. per gallon for 90/190.

Motor benzole.—New business is scarce. Quotations are round 1s. 4d. to 1s. 4½d. per gallon *ex* works in bulk.

Pyridines remain inactive; 90/160 being 3s. to 3s. 3d. per gallon.

Benzole Prices.

The following are considered to be the market prices at the present time:

	s. d.	s. d.	
Crude benzole	0 7½	to 0 8½	per gallon at works
Motor ,, ...	1 3	,, 1 4	,, ,, ,,
Pure ,, ...	1 7½	,, 1 8½	,, ,, ,,

Diaries, Calendars, &c.

Acknowledgment is made of the receipt from the following friends of seasonable gifts in the form of diaries, calendars, &c.:—

Alder & Mackay, Ltd., New Grange Works, Stewart Terrace, Edinburgh.

W. G. Beaumont & Son, Priory Works, Bow, London, E.

Chancery Lane Printing Works, Ltd., Plough Court, Fetter Lane, London, E.C.

Gas Chambers and Coke Ovens, Ltd., Artillery House, Westminster, S.W.

Gas Meter Company, Ltd., 238, Kingsland Road, London, E.

Lunt Bros., Colmore Row, Birmingham.

Luton Gas Company's Showroom.

Standard Furnace and Setting Company, 150, Lord Street, Southport.

Staveley Coal and Iron Company, Ltd., near Chesterfield.

John G. Stein & Co., Ltd., Bonnybridge, Scotland.

United Steel Companies, Ltd., Sheffield.

Wailes Dove Bitumastic, Ltd., Collingwood Buildings, Newcastle-on-Tyne.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Dec. 19.	Rise or Fall on Week.	Transact'ns Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 14	5	5	Aldershot 5 p.c. max. C.	78—78	..	..
522,992	,,	,,	4	4	Do. 4 p.c. Pref.	73—76	..	..
1,551,868	,,	Oct. 9	7⅞	7⅞	Alliance & Dublin Ord.	100—105	..	102½—103⅜
374,000	,,	July 10	4	4	Do. 4 p.c. Deb.	72—77	+9	75
522,655	,,	Aug. 28	7	7	Barnet Ord. 7 p.c.	108—111	..	..
300,000	1	Oct. 23	1/4½	1/7½	Bombay, Ltd.	15/6 - 17/6	..	..
174,500	10	Aug. 14	9	9	Bournemouth 5 p.c.	14½—15½	..	..
500,050	10	,,	7	7	Do. 3 7 p.c.	12½—13	..	12½
439,160	10	,,	6	6	Do. Pref. 6 p.c.	11—11½	..	..
50,000	Stk.	Dec. 18	3	3	Do. 3 p.c. Deb.	57 - 60*	−1	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78*	−2	..
357,900	,,	Aug. 28	7½	7½	Brighton & Hove 6 p.c. Con	112 - 117	..	114
371,880	,,	,,	6½	6½	Do. 5 p.c. Con.	102—105	..	..
1,287,500	,,	July 24	5	5	Bristol 5 p.c. max.	93 - 94*a*	..	..
855,000	,,	Sept. 25	8	7	British Ord.	108—113	..	..
100,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref.	109—114*	−3	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	74—77*	−1	..
450 000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	95 - 98*	−2	..
100,000	,,	June 26	5	5	Cambridge 5 p.c. Deb.	97—100	..	..
100,000	10	Dec. 4	10	6	Cape Town, Ltd.	88—92	..	..
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref.	6¾—7½	..	7
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb.	70—75*	−1	..
626,850	,,	July 24	6	6	Cardiff Con. Ord.	95—98	..	..
287,850	,,	June 26	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	..
157,150	,,	Aug. 14	5½	5	Chester 5 p.c. Ord.	86—91*b*	..	..
98,936	1	Oct. 9	†2/-	†2/-	Colombo, Ltd. Ord.	33/—34/-	..	..
24.500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	19/—20/-	..	..
609,204	1	Oct. 9	1/9⅜	1/4½	Colonial Gas Assn. Ltd. Ord	16/6—18/6	..	..
396,058	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	19/—20/-	..	..
2,073,280	Stk.	July 24	7	6	Commercial Ord.	95 - 98	..	96½—97½
475,000	,,	Dec. 18	3	3	Do. 3 p.c. Deb.	57—60*	−1	..
787,560	,,	Aug. 14	7	7	Croydon sliding scale	106—109	..	..
453,100	,,	,,	5	5	Do. max. div.	83—86	..	84
542,270	,,	Aug. 14	10	7	Derby Con.	115—125*a*	..	..
55,000	,,	Dec. 18	4	4	Do. Deb.	65—70*	..	..
209,000	,,	Aug. 28	5	5	East Hull Ord. 5 p.c.	72—75	..	..
1,002,180	,,	Sept. 25	†7*g*	†4	European, Ltd.	100—110	..	102—104
18.629,125	,,	July 24	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	19/6—20/-*f*	..	19/6—20/-
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	63½—65½	..	64
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	79—81	..	80⅜—81⅛
5,602,620	,,	Dec. 18	3	3	Do. 3 p.c. Con. Deb.	60—63*	−1	61⅛—63⅛
8,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	99—102*	−2	..
161,490	,,	Sept. 11	10	10	Harrogate Cons. 10 p.c. max.	155—160	..	..
82,500	,,	Aug. 28	7	7	Hastings & St. L. 5 p.c. Conv.	98 - 103	..	..
258,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	79—84	..	..
70,000	10	Oct. 9	½	10	Hongkong & China, Ltd.	13—14	..	..
213,200	Stk.	Aug. 14	6	6	Hornsey Con. 3½ p.c.	88—91	..	..
2 436,594	,,	Nov. 6	25	15	Imperial Continental Cap.	335—355	−5	340—348
228,180	,,	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	50—85	..	..
235,242	,,	Aug. 14	8½	8½	Lea Bridge 5 p.c. Ord.	123—128	..	..
2,145,907	,,	Aug. 14	6	6	Liverpool 5 p.c. Ord.	96—97*b*	..	..
600,000	,,	Sept. 25	7	7	Do. 7 p.c. Red. Pref.	99—101*b*	..	..
165,736	,,	Aug. 28	8	9	Maidstone 5 p.c. Cap.	123—128	..	..
63,480	,,	Dec. 18	3	3	Do. 3 p.c. Deb.	54 - 57*	−1	..
75,000	5	Dec. 4	†10	†10	Malta & Mediterranean	5½—5⅝	..	..
892,000	—	Oct. 1	5½	5½	Metrop'litan (of Melbourne) 5½ p.c. Red. Deb.	88—91	..	..
675,000	Stk.	Nov. 20	†8	†6	Montevideo, Ltd.	100—110	..	100
2,061,815	,,	July 24	5⅝	5	Newcastle & Gateshead Con.	16/9—17/3*df*	..	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	72—73*d*	..	..
691,705	,,	June 26	3½	3½	Do. 3½ p.c. Deb.	66½—67½*d*	−1	..
169,940	,,	Aug. 28	7½	7½	North Middlesex 6 p.c. Con.	115—120	..	..
396,160	,,	Aug. 14	5	5	Northampton 5 p.c. max.	76—81	..	..
300,000	,,	Nov. 20	7	9	Oriental, Ltd.	104—109	..	..
60,000	5	18 My., '15	—	—	Ottoman	0—¼	..	..
205,162	Stk.	Dec. 18	8	8	Plym'th & Stonehouse 5 p.c.	107 112*	−3	..
424,416	,,	Aug. 28	8	8	Portsm'th Con. Stk. 4 p.c. Std	115—120*	+8	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	80—83	+1	..
186,000	100	Dec. 1	4	4	Primitiva 4 p.c. Red. Deb.	97—100	+1	..
677,837	Stk.	July 24	4	4	Do. 4 p.c. Red. Deb. 1911	83—86	..	..
371,496	,,	Dec. 18	4	4	Do. 4 p.c. Cons. Deb.	83—86*	..	85½—86¼
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref.	8½ - 8⅞	..	..
1,736,368	Stk.	Aug. 28	6¼	6¼	Sheffield Cons.	105—107*e*	..	..
95,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—78*e*	..	..
90,000	10	June 5	†4	†5	South African	4—6	..	..
6.709,895	Stk.	Aug. 14	7½	5	South Met. Ord.	104—108	..	104½—105⅞
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	112—115	..	113½—114½
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb.	60—63	..	..
734,000	,,	Sept. 11	6¼	6¼	Do. 6¼ p.c. Red. Db.	99—102	..	..
91,500	,,	Aug. 14	8¼	8¼	South Shields Con.	108—110*d*	+1	..
1,548,795	,,	July 24	6¾	6¾	South Suburban Ord. 5 p.c.	102—105	..	103½—104
468,827	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	98—101*	−1	101¼
647,740	,,	Aug. 28	5	5	Southampton Ord. 5 p.c. max.	75—78	..	76¼
121,375	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	76—78*	−1	..
179,014	,,	July 24	8	8	Sutton Ord.	115—120	..	..
94,500	,,	June 26	5	5	Do. 5 p.c. Deb.	96—99	..	..
250,000	,,	Aug. 28	7	7	Swansea 7 p.c. Red. Pref.	98—101	..	..
200,000	,,	Dec. 18	6¼	6¼	Do. 6¼ p.c. Red. Deb.	100—103*	−2	104¼
1,076,490	,,	July 24	6⅝	6⅝	Tottenham District Ord.	103 - 107	..	105⅝
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	98—101	..	..
199,005	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	76—79*	−1	..
182,380	10	30 Dec., '12	—	—	Tuscan, Ltd.	2—3	..	..
85,701	Stk.	Sept. 25	6	6	Do. 6 p.c. Red. Deb.	74—79	..	..
309,094	,,	Aug. 28	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	95—100	..	98
88,330	,,	,,	5	5	Do. 5 p.c. pref.	88—93	..	91½
1,180,970	,,	July 10	—	7	Wandsworth, Wimbledon, and Epsom Cons.	108—113	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref.	95—98	+1	..
488,344	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	97—100*	−2	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. *g.*—Paid on £10 shares. * Ex. div. † Paid free of income-tax. ‡ For year. ‖ Div.=10 p.ct. p.a. less tax and less tax on interim dividend.

(This announcement is inserted gratuitously.)

PETER—WITH ONE EXCEPTION

With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun and on occasions—be it admitted—of naughtiness.

Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception.

Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

Would you like to know more about him? How, in spite of his "One Exception," he is being educated, and, when older, technically trained and usefully employed.

There is a long waiting list of "Peters" throughout the British Isles, for whom training and accommodation must be provided in the immediate future.

Will you help with a donation or annual subscription? Any sum, large or small, will be gratefully received.

Here's a suggestion. Your eyesight is worth 3d. a year to you. Send Peter and his handicapped pals 3d. for every year you've had it. Now, please, in case it slips your memory. Good idea!

THE CHAIRMAN,

SCHOOL FOR THE BLIND

(Founded 1838),

Swiss Cottage, LONDON, N.W.3

JUST PUBLISHED

PRICE 21/- NETT.

Electricity on Gas Works

BY

H. C. WIDLAKE, A.M.I.E.E.,
Assoc.M.Inst.Gas E.

Demy 8vo ; 198 pp. ; 15 Drawings ; Bound Red Rexine ; Gold stamped.

Introducing his Treatise, the Author says :

¶ Among the many noteworthy changes which the past decade has witnessed in the Gas Industry, few are more characteristic of the times than the ever-increasing use which is being made of electric power for the operation of the various units of gas manufacturing and distributing plant. Practically all branches of the Engineering Trades have during the past few years opened their doors to the electrical system of power application, irrespective of whether they are or are not directly or indirectly in competition with electrical interests.

¶ The electric motor has been extensively adopted on manufacturing plants in the principal Gas Undertakings in this country, on the Continent, and in the United States of America, and in view of the special conditions which have to be met on gas plants, there are few purposes for which it is more naturally adapted. Incidentally, no greater compliment has ever been paid to this type of power converter than is implied by the readiness with which Gas Engineers are willing to entrust to it the driving of the most important portions of their plant.

Extracts from a Review by E. G. STEWART, M.Inst.Gas E., in the "Gas Journal," November 12, 1930.

"The book is carefully arranged, clearly written and illustrated, and is provided with a very complete and valuable index. The information is obviously the result of long experience combined with deep insight and wise judgment. It would be difficult to criticise adversely any of the frequently occurring *obiter dicta*."

"Mr. Widlake has not entered upon the domain of the electrical text book, but he has produced an ideal *vade mecum* for the Gas Engineer embarking upon the use of electricity on his works, and as this review will perhaps have indicated, a volume full of interest and value to those who have already had experience in the direction of applying electricity."

WALTER KING, LTD., "GAS JOURNAL" Offices, 11, Bolt Court, Fleet Street, London, E.C. 4

CONTENTS

EDITORIAL NOTES.

A GLANCE AT THE CONTENTS . . . 949
"GAS JOURNAL" Review—
1930 950
Of Particular Concern to Us 950
The Industry and Legislation 951
National Work 951
Gas Production 952
Heating the Settings 952
Disposal and Recovery 953
Purification 953
Distribution and Lighting 953
Radiation and Convection 954
Coal in 1930 954
Bye-Products in 1930 955
Gas Stocks and Shares 955

CORRESPONDENCE.

Obtaining Records of Retort Spalling . . . 957
Corrosion of Pipes 957
Waste-Heat Recovery from Horizontals . . 958

Obituary—
Lord Melchett 959
Alexander Waddell 959
Personal 959
Forthcoming Engagements 959

THE NEWS OF THE WEEK.

Reduction in Price by the Newcastle-on-Tyne Gas Company—Messrs. Falk, Stadelmann's Annual Dance—Blackburn Corporation Gas Department—Salerni Carbonization Process, Ltd.—Minister of Transport's Plea for British Tar—Barnet District Gas and Water Company—Darwen Gas Department 960
Stoke-on-Trent to Give Bulk Supply . . . 960
Truro Company's Revised Scale of Charges . 960
Gas Restrictions—Protest at "Victimization" of Council House Tenants . . . 960
Consumers' Gas Company of Toronto—Eighty-Second Annual Meeting 960
British Chemical Plant—Arrangements for Next Year's Exhibition 961

In Continental Countries—Abstract Translations from the Technical Press of France and Germany 961
Demonstration of New Gas Furnaces . . . 962

THE "JOURNAL" TECHNICAL RECORD.

Yorkshire Junior Gas Association—Waterless Gasholders. By L. Hartley, M.I.Mech.E., M.Inst.Gas E. 963
Coking a Banded Bituminous Coal: The Part Played by Each Band. By C. P. Finn, M.Sc., F.I.C., M.I.Chem.E. 965

THE "JOURNAL" TECHNICAL RECORD—(*continued*).

Wales and Monmouthshire Junior Gas Association—
Experiences in Fixing Gas Appliances. By R. T. Mills 968
Humidity Control in Dry Purification . . 970
Scottish Junior Gas Association (Eastern District)—
Visit to St. Andrews Gas-Works 971
The "Dri-Gas" Plant at St. Andrews. By A. Morris 971

GAS MARKETS AND MANUFACTURES.

Stock Market Report 972
Current Sales of Gas Products 972
Contracts Advertised To-Day 972
Trade Notes 972

Diaries, Calendars, &c., Received 972

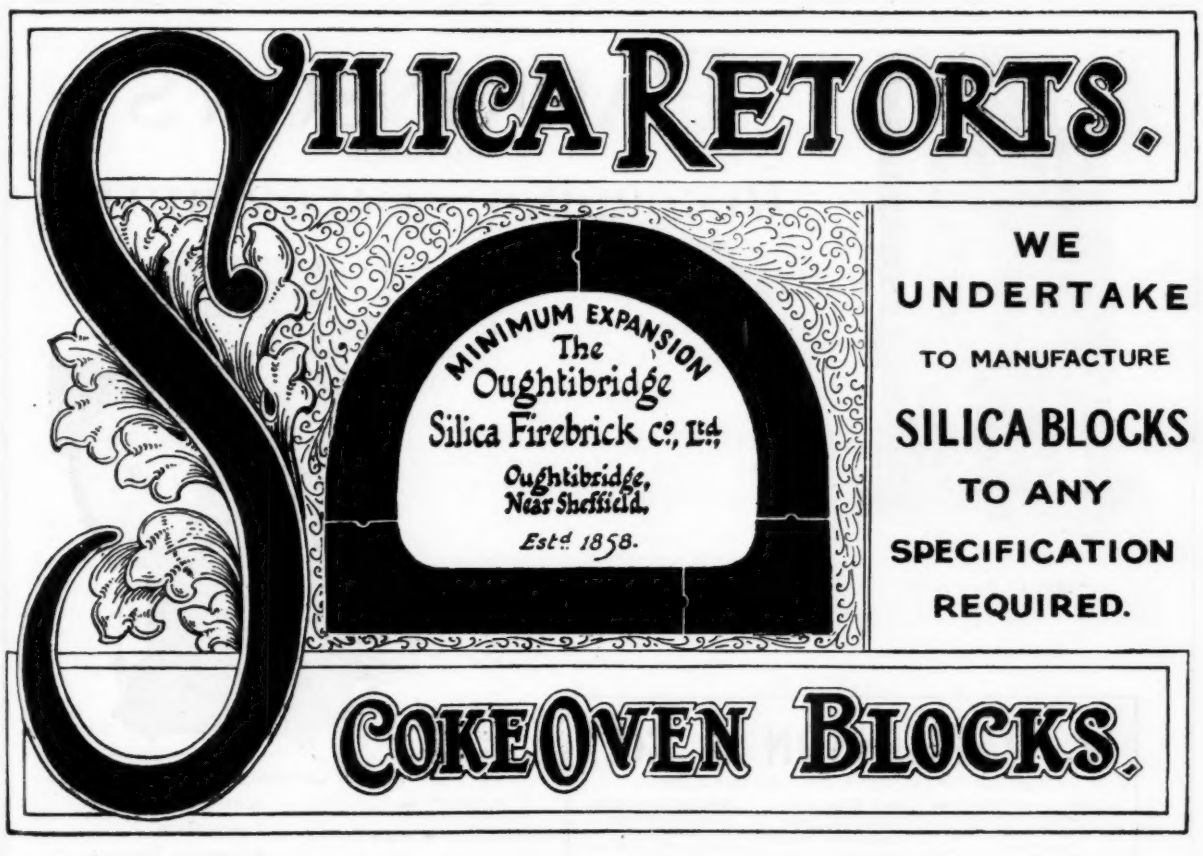
PARLIAMENTARY INTELLIGENCE.

House of Lords—
Special Orders 972
House of Commons—
Special Orders 972

LEGAL INTELLIGENCE.

Assets of Windermere Gas Undertaking . . 972

Stock and Share List 973



Thomas Glover

Gas-Fire Meter

Easily Set to pass any quantity of gas for coin

Simple to operate and to turn off unconsumed gas

Secure : Neat & Compact

Folders for distribution can be had on application

THOMAS GLOVER & Co. LTD.
Original Dry Meter Makers :: Established in 1844

GOTHIC WORKS : Edmonton, N.18
& Branches

"GROSS" OR "NETT."

PARKINSON'S

IMPROVED

RECORDING CALORIMETER

(Bessley's Patents).

CHARTS NEED NO CORRECTION.

CAN BE SUPPLIED FOR GAS OF ANY CALORIFIC VALUE.

A GREAT BOON FOR *ECONOMIC WORKING.*

PATENT CONTROLLER, DEALING WITH
Density
Temperature
Barometric Pressure
(Can be supplied separately).

W. PARKINSON & CO.,
INCORPORATED IN PARKINSON & COWAN (GAS METERS), LTD.

COTTAGE LANE, CITY ROAD, LONDON, E.C.1.
Telegrams: "INDEX, 'PHONE, LONDON."
'Phone Nos.: 4270 Clerkenwell

BELL BARN ROAD, BIRMINGHAM.
"GASMETERS, B'HAM."
2245 Midland, B'ham.

RAPHAEL ST. WORKS, CROMAC STREET, BELFAST.
"PREPAYMENT, BELFAST."
3374 Belfast.